

#### The SAILOR MAN

3 Screens-Plus-"INVISO SCREEN"

## The First 64K Arcade Game For the Color Computer

The first screen objective is to catch enough of Elsie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right onto Bigfatbadguy's head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with **Bigfatbadguy** who is actively pursuing you. You must also be careful of **Olduglysea-woman** who will appear at higher difficulty levels to chuck empties at you. Either avoid the flying bottles or punch them (with the fire button) to keep from being knocked into the water.

The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of Fatguyeatingahamburger's teetertotter to fly up a deck and even two decks if you manage to catch hold of Smartaleckkid's grab handles. Time it right and away you go.

The Third screen objective is to collect enough letters (thrown by Elsie's cries for H-E-L-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

On all screens, eating a can of **collard greens** (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and agility and allow you to send **Bigfatbadguy** into the drink with a single punch.

#### PLUS...

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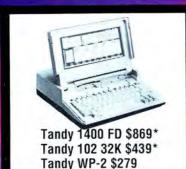


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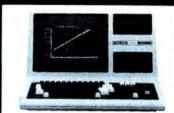
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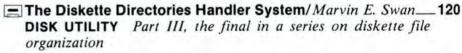
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Block Out Troublesome Granules/Charles C. Zimmer \_\_\_\_\_\_\_ DISK UTILITY A thorough test program for checking your disks for errors

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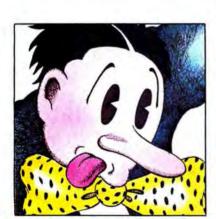


GRAPHICS Seven short programs to delight and amuse you

Scroll Control And LList Masterr/H. Allen Curtis \_\_\_\_\_\_\_\_150
UTILITY Modifying a BASIC command

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PROGRAMMING UTILITY A short graphics routine for visual entertainment

EXPANDING BASIC Part VII, teaching CoCo to clean up after its errors



#### COVER art® by Fred Crawford

The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 220.

NEXT MONTH: In direct response to our RAINBOWfest-Princeton survey, February will be our "Utilities Issue" because of the high interest in, and demand for, these programming helpers.

We'll also kick off RAINBOW's third annual Adventure contest in addition to our usual wide spectrum of articles and programs. Look for THE RAINBOW for more on the Color Computer than is available from any other source!

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#### COLUMNS BASIC Training/Joseph Kolar \_\_\_\_\_ An open-ended exploration Bits And Bytes Of BASIC/ Richard White \_\_\_\_\_\_\_233 Finalizing the Rainbow checkbook Building January's Rainbow/Jim Reed \_\_\_\_\_ \_16 Highlights from the RAINBOWfest survey Byte Master/R. Bartly Betts \_\_\_\_ 242 The 6809 instruction set — zeroing in on "the real thing" Earth To Ed/Ed Ellers\_\_\_\_ 174 Beam up those "tech" questions Education Notes/Steve Blyn \_\_\_ Helping youngsters form categories Education Overview/ Michael Plog, Ph.D. \_\_\_\_\_\_\_159 A practical alternative for creating a pupil database Game Master's Apprentice/ George Firedrake and Art Canfil \_\_\_\_\_128 Designing your own Adventure Print#-2,/Lawrence C. Falk\_\_\_\_\_ 12 Editor's notes School Is In The Heart Of A Child/Bob Albrecht and Ramon 48 Binary birthday cakes, letters and more Wordsworth Turn Of The Screw/Tony DiStefano \_ 68 An introduction to the inside of the CoCo 2 ■ Wishing Well/Fred Scerbo 32 EZ-graphics — '85 style RAINBOWTECH Downloads/Dan Downard \_\_\_\_\_ 258 Answers to your technical questions Personable Pascal/Daniel A. Eastham \_\_\_\_\_ 261 Block structure and recursion hogg\_wash/Frank Hogg \_\_\_\_\_ More 128K 272 OS-9 Utility/Lew Middaugh \_ Random numbers for the OS-9 C compiler 280 Random Basics/Paul Searby \_ Design and development of application software, part V DEPARTMENTS Reviewing Reviews \_\_\_\_\_ 191 Advertiser Index\_\_\_\_\_ 288 Back Issue Information \_\_\_\_\_ 93 Scoreboard\_\_\_\_ CoCo Clubs \_\_\_\_\_ 252 Scoreboard Pointers \_\_\_\_\_ 180 Corrections \_ 232 Submitting Material To Rainbow \_\_\_\_\_\_\_ 194 These Fine Stores \_\_\_\_\_\_ 286 Letters To Rainbow \_\_\_\_\_\_ 6 The Pipeline \_\_\_\_\_\_ 136 Received And Certified \_\_\_\_\_ 188 PRODUCT REVIEWS Product Review Contents \_\_\_\_\_ 185



January 1985

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> For RAINBOW Advertising and Marketing Office information, see Page 288

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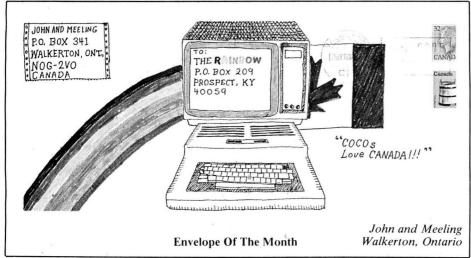
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Limited back issues are available. Please see notice for issues which are in print and costs. Payment accepted by VISA, MasterCard, American Express, Cash, Check or Money Order in U.S. currency only.

#### ETTERS TO THE RA

#### ARTS AND LETTERS



programs and more dialogue), I have this suggestion. Yes, we would like to see good, long version programs, but how about a compromise? Split the long programs over a couple of monthly editions. I don't think we will mind much and it gives a rest in between listings on the key-in. It would be to your advantage, too - it gives you more pages for articles and maybe increased circulation. Those who buy off-the-shelf magazines will have to buy next month's or make requests for last month's if they only have the second half.

In your article ["Building October's Rainbow," Page 16] on what to put in THE

RAINBOW (re: long 64K programs vs. short

John Felker St. Catharines, Ontario

#### PRIDE AND PREJUDICE

Editor:

Whether you ever publish this in your magazine or not, I've held the pride I feel in your publication back far too long!

Unfortunately, I'm an old lady and cannot read the computer language and I deeply regret that. However, I read all the English parts I possibly can and love every minute

I'm sure the staff is excellent and your Editor is very fortunate to have you. I couldn't be more prejudiced than I am to your Editor, because I am Lonnie's Mom.

Mildred C. Falk Birmingham, AL

#### WHAT'S A MOTHER TO DO?

Regarding your article in the October '84 issue of RAINBOW, "Everyone Wants More

RAM . . . ," I am a new CoCo owner and a mother of four kids. If I want "my turn" it has to be when the kids are in school or in bed so I relate to your problem in terms of my own dilemma; not enough RAM in my days and not enough K's in my CoCo. The K problem I am going to deal with by having a 64K package and a doubledisk drive added to my unit. As for getting my share of time with the unit, well, the kids will eventually leave home and I'll get more time on the CoCo then.

I am enjoying my computer, but for my money RAINBOW has really added something special to our family's computer experiences. Keep THE RAINBOW bright!

> Kathy Fieldsted Lundar, Manitoba

#### MAKING A COMPROMISE

Editor:

I think THE RAINBOW is an excellent magazine and is well laid out. Keep up the good work.

#### BLUEPRINTS FOR THE BUILDER

The computer desk plans that Lloyd Wing (October 1984, Page 7) and other computer buffs may be interested in are in Mechanix Illustrated, February 1984.

The plans offer a flexible arrangement with locked compartment and a slide-out tray holding the computer keyboard.

Although the desk is made out of red oak plywood in the article and is estimated to cost \$180, a less expensive grade of material could be used with excellent results.

> Thomas Remakel Dubuque, IA

Editor:

I have been buying magazines for 29 years for the purpose of learning and improving my abilities. THE RAINBOW is by far the best I have read. Enough, too much flattery might cause you to byte your bits.

In the October 1984 issue was a request for the location of some home built computer table plans. I recommend the August 1984 Popular Science. There are several excellent computer table projects — winners of the annual plywood panel construction contest — well worth looking at and not expensive to build.

As for the already built, everybody with furniture is featuring some kind of computer furniture — at all kinds of prices.

Keep up the outstanding work and on to the next RAINBOWfest!

Robert A. Clark Mooretown, NJ

#### ON THE HUMOROUS SIDE ...

Editor:

It appears that in the October issue, "Information Please" section of the "Letters To THE RAINBOW" you must have left out much of Lloyd E. Wing's request, i.e., "I would like an example of both a purchased and homemade product: allowing for a monitor, disk drive and printer."

. . another printer (for color), Y cable, ROM pack, another disk drive, cassette recorder, diskette filebox, another diskette filebox, chart and paper storage, six or more desk drawers, cassette filebox, another cassette filebox, notepad, pencil holder, trash basket, 20 gallon trash can — rubber, it hurts less when you kick it (Note: a 9600 Baud printer requires 33 gallons or better), desk lamp, aspirin holder, at least a 200socket spike protected extension cord (a dedicated utility company may be substituted), modem, RS-232 switcher, printer interface, telephone, holder for THE RAINBOW magazines, bookcase, coffeepot with cup (an A.A. meeting list may be substituted), CoCo programming will require a change of socks and underwear (for all night sessions), calendar, radio, intercom (to let the family know of success — the sound of foot striking rubber trash can will suffice for failure), inbasket - nothing ever leaves, clock, checkbook (filled and solvent) a jillion stamps, envelopes, helpfully a Bible, picture of loved ones (for later comparisons), portable potty (not required if touch typist), dictionary for Adventures and a place to store joysticks . . .

THE RAINBOW is doing Mr. Wing a great disservice by failing to correct his letter to

a more realistic request.

DaDa and CoCo Hatton Cockeysville, MD

#### HINTS AND TIPS

Editor:

I own a CoCo 2 which I recently upgraded to 64K. I found out that the IBM PC uses the same 4164 RAM chips. I was able to buy nine 150ns chips for \$39 plus tax at an Austin PC store. So, when thinking of upgrading, check to see if there are any bargains at your local PC store before you settle for 200ns chips.

I've received a tremendous amount of enjoyment in the three months that I've owned my CoCo. The very first program I typed in was a "Sample Program #5" from the Extended BASIC Manual. If you like graphics, but don't enjoy typing long

listings, you'll love this one. It is short and sweet. Be sure to make the following changes for different effects:

1) 3 POKE 65495,0 5 PMODE 4,1 10 PCLS 15 SCREEN 1,1 80 GOTO 20

2) delete lines 30,35,65,70 replace Line 40 with: 40 COLOR RND(4)-1,RND(4)-1

First do the changes in part 1 and RUN, then do the changes in part 2 and RUN.

Daniel Ortiz Austin, TX

#### **BACK TALK**

Editor:

I have been copying listings from THE RAINBOW into my Color Computer, but found it quite tedious to keep glancing from the magazine to the keyboard to the CRT screen. The other night I was wishing I could persuade my wife to read the listings to me, when it suddenly occurred to me I could dictate the listings to a cassette tape, then play that back while typing in the program. With a little experimentation in speed, groupings of characters, etc., I found this a big improvement. I used a foot switch, which is available at Radio Shack, to control the recorder while typing the listings.

I hope this helps others as much as it has helped me.

Russell R. Yost Phoenix, AZ

#### **EDITING ERRORS**

Editor.

I have discovered that it is easier to correct errors if you type EDIT and the line number (e.g., EDIT 100) then press 'X' and backspace to the error. If you run out of paper while printing something, you can press the SHIFT @ key which will pause it, change paper and then press any key to start printing.

Robert Bowlby Spencer, WV

Editor:

To all you people who wound up with an Epson MX-80 printer and Radio Shack's Disk Color *Scripsit*, and found out all you could print was garbage: if you use the print spool feature of *Scripsit*, not only will the printer work, but you'll be able to work on something else while it's printing the spool file.

Thanks for one terrific magazine. you make the CoCo worthwhile.

Andrew R. Ilowit Hollywood, FL

#### WITH A FLIP OF THE SWITCH

Editor:

I have recently purchased the 64K Disk version of *Coco-Accountant II* from Federal Hill Software and the RGS Micro Dual DOS Card from Software Support.

Coco-Accountant II is a very good program; in fact, I am using it to do the

P.T.A. records. It does everything Federal Hill Software states, and is menu-driven.

The only problem is that the 64K Disk version is not compatible with JDOS. It must be used with Disk BASIC. This presented a problem in the beginning, as I did not know why the program did not function properly; however, with Federal Hill's help and assistance, we found that it was due to my use of JDOS. This is why I purchased the Dual DOS Card and Switch.

The directions that came with the Dual DOS Card were easy to follow and the installation was quickly performed. The hardest part was to drive a hole for the

switch.

With this Card I can change from JDOS to Disk BASIC just by the flip of the switch and I don't have to worry about future incompatibility with JDOS.

Harold M. Bloom Princeton, NJ

#### 'CASTING' LINES

Editor:

If you would like to play *Gone Fishing* (THE RAINBOW, Jan. 1984, Page 158) and not have your line disappear, make the following changes in your program:

220 GET (125,128)-(135,136),M,G 600 LINE (149,40)-(149,K),PSET 610 PUT (140,K+0)-(150,K+6),M,PSET

> Ted Mayor East Greenbush, NY

#### POSITIVE OR NEGATIVE

Editor:

In the September 1984 issue [Page 6], Burnie Whiddon from Orlando gave a method of finding the exclusive OR of two integers. His method works for integers from 1 to 32767, but there is a simpler method to do the same thing and it works from -32767 to +32767. Of course, you have to know how the negative numbers are stored. Try the following lines:

10 INPUT"NUMBERS TO XOR";A,B 20 PRINT (A OR B) - (A AND B)

These will produce the desired XOR.

Mike Moore
Nepean, Ontario

#### ALL IN THE FAMILY

Editor:

As the publisher and exclusive marketing agent for the genealogical database Family, I would like to thank Mr. Howard Lee Ball for his praise of the program Family in a review of another genealogy program [Ancestors 2.0 November 1984, Page 218]. The review states that Mr. Knight cooperated with the writer of Ancestors which is a diskbased system. Family was originally a tapebased system only.

We would like to inform the readers that Petrocci Freelance Associates has converted

January 1985

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Mr. Knight's Family to disk so it is now available on both tape and disk. The new disk version is \$19.95. We feel it is only fair to Mr. Knight to make sure that readers know that his own program, Family is available in either format.

Susan Petrocci Petrocci Freelance Associates Tucson, AZ

#### INFORMATION PLEASE

Editor:

Can someone send me a copy of the *Real Talker* "English to Phenome Dictionary?" They are no longer available from Colorware. I would be happy to pay for the copies. Thanks. Write to me at Rt.1, Box 103, 56444.

Gary Hansen Deerwood, MN

Editor:

Congratulations on a fine magazine. Each month, with about five magazines of interest in the electronics field coming to me, yours rates tops.

I am interested in a program to help locate the settings for a TVRO (television receive only) antenna.

It would allow me to enter my latitude and longitude, degrees, minutes and seconds. Then the location of the desired satellite in the Smith Belt and tell me the elevation and degrees from true north to set the antenna.

With all the interest in earth stations, privately owned, if the program is not available maybe someone would be interested in writing one. A program writer I am not. Write me at Box 471, 44815.

Carl E. Nay Bettsville, OH

Editor:

It has been suggested to me that your magazine might be able to assist me in finding out if there is a magazine subscription

which might pertain to the MC-10 Color Computer put out by Radio Shack.

I am particularly interested in finding out what cassettes, if any, are available for this computer and where a person might obtain the same.

Ann Lobb Hay River, Northwest Territories

Editor's Note: Please refer to Radio Shack's 1985 Catalog, Page 167.

#### GOLD IN ENGLAND

Editor:

As a refugee following the demise of *Chromasette*, I can see I have been missing a great deal in not subscribing to THE RAINBOW before now!

Do you have many readers in England? Maybe we can get some together to try and get reasonably priced software over here. Importing software from the United States results in having to pay six percent of value in customs charges and then VAT (tax at 15 percent on top of the converted dollar rate and the customs charge). The choice of non-Radio Shack software over here is severely limited.

Fancy finding the 'pot of gold' at the end of a rainbow over 4000 miles away. Isn't science wonderful!

Contact me at 14 Upcroft Ave., Edgware, Middlesex HA8 9RB England.

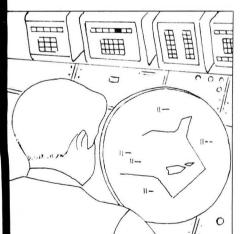
Norman Allen Middlesex, England

#### Editor:

I am writing in response to the request of Mr. Dieter Klose in the November 1984 "Letters To THE RAINBOW" column. Mr. Klose inquired about computers and graphics printers for use in the production of his large-scale animated cartoon. Your Editor's Note suggested our program, The Animator, might help. While we thank you for the mention, I believe Mr. Klose had something else in mind. To set the record straight, The Animator does not support output to a graphics printer. A special "commercial version" of The Animator is being used by several graphics and advertising companies (making transfers directly to videotape). For Mr. Klose's purposes, we would recommend either a full-scale mainframe system or traditional film animation.

Stan Osterbauer, President Triad Pictures Corp. Seguim, WA

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#### PIRATE PENDENCY

Editor:

Please accept my compliments on the most valuable peripheral I buy for my Color Computer. The high point of my month is always the arrival of THE RAINBOW. I would also like to cast my vote in favor of an article or series on FORTH.

I would like to commend these suppliers: Prickly-Pear Software, Spectral Associates, Spectrum Projects, Tom Mix Software and Double Density Software.

Lastly, I would like to toss out a few comments about software piracy. My question is to the software vendors who deal exclusively, or almost so, in imitations of arcade games. What legal right do these companies have to copy arcade games without licensing them from the original manufacturers? I hear a lot of whining and screaming from these manufacturers about people stealing their software, but it seems to me a case of the pot calling the kettle black. I invite rebuttal from the manufacturers.

> Richard P. Adams Mesquite, TX

#### KUDOS

Editor:

This magazine definitely is the best CoCo magazine around! The programs are always new, creative and exciting. It makes me feel good when I read about new hardware or software because I know you really know what you're talking about.

Keep up the good work on your great magazine!

Todd Amodeo Winthrop, MA

Editor:

Congratulations on the success of your magazine. I'm a subscriber of your colorful

magazine. I live in Canada and I've been wondering why nobody thought of doing a RAINBOWfest here in Canada. Everybody is 'CoCo' about THE RAINBOW magazine

> Serge Larecque Montreal, Quebec

Finally, and most importantly, I'd like to thank THE RAINBOW for supporting the shows and especially the CoCo. You guys have done a great job and we wouldn't be here without you.

Thanks to all.

Eric W. Lund Millington, NJ

#### APPLAUSE, APPLAUSE!

Editor:

As the New Brunswick RAINBOWfest was excellent, the Princeton RAINBOWfest exceeded it by far. I must say that both shows were worthwhile.

I have many, many companies to thank. To start off, for the New Brunswick show, I must thank Mark Data Products for their excellent Super-Pro keyboard and Tom Mix software for their quick delivery of SR-71.

For the Princeton show there are many more companies to thank. First on the list is Computer Plus for their service and the great price on the Okidata Microline 92 printer. (Not to mention the Okidata company for the quality of the printer.) Next, I should mention Micro World II's friendliness and good price on Sam Sleuth by Computerware. (Anybody know where some more evidence is on level 2? Got them to the 'lot' but arresting them doesn't work!)

How about MichTron for their Mach II joysticks, for giving us a free Mudpies game, and for a good price on Graphicom. Yes, they do discount at RAINBOWfests! Thanks to Moreton Bay Laboratory for their Bjork Blocks (Graphicom and Bjork Blocks are perfect together).

I'd also like to commend Compukit Corporation. Their 64K upgrade for \$38, including installation, was a bargain. Although we had some trouble with it, bringing the computer back the next day remedied the problem.

Editor:

Just a line to let you know how much my buddies and I like your magazine, THE RAINBOW. You seem to have an endless supply of goodies. I always try to point a new CoCo owner in the right direction right to RAINBOW, that is.

Cooking With CoCo" by Colin J. Stearman is a good example. I have enjoyed every segment so far. He is a fantastic writer

in my opinion.

You have too many great articles for anyone to mention them all. As for my CoCo getting lonesome, not as long as I can get a RAINBOW! But my fingers are getting a little stiff, so I also get RAINBOW ON TAPE.

Keep all those great articles, and great people working for us.

> Harold Lame Gallatin, TX

On Sunday, September 30, 1984, the drawing for the soft sculpture doll was held at RAINBOWfest in Princeton, N.J. Drawing the tickets for the PJCCC was Willo Falk of THE RAINBOW magazine. Standing by as verifying official was Dan Downard of THE RAINBOW. The winner of the doll was Paul Eckhard, RR 1, Box 152, Palmerton, PA.

> Penn-Jersey Color Computer Club Easton, PA



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decision, or cases that need briefs filed next month!

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\*PERFORMANCE PER DOLLAR: There are cheaper filing programs, but none with the power and performance of the FreeForm Filer.

\*A REVIEW BY RAINBOW MAGAZINE said no other filing program "can match the abilities and capabilities" of the TMP/FreeForm Filer for "applications that require a lot of text, very variable search criteria, speed and efficiency."

The TMP FreeForm Filer runs on OS-9 systems and requires 64K RAM, one disk drive, and an 80-column screen. (Also available for IBM-compatible computers, and Sanyo MBC 550 and MBC 555, Zenith Z-100, Canon AS-100 and CX-1, Victor 9000, and Tandy 2000.) Worlds of Filiable



NOT A Game - A Very Realistic Flight Simulation







WORLDS OF FLIGHT (WOF) is a "view" oriented flight simulation for the TRS-80 Color Computer, written entirely in Machine Language. "View" oriented means that the pilot may determine his or her position by actually viewing the sur-rounding landmarks as opposed to using instruments which sense navigational references. This is a major departure from "instrument only" simulations which can be achieved through BASIC programs. Most instrument maneuvers and procedures may be practiced. The craft is a light-weight, single-engine airplane with low wings. A nose wheel which is both steerable and retractable is also modeled. Some aerobatics are possible including sustained inverted flight, aileron rolls, spins and stalls.

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really can't think of a nicer time of the year — and the only thing that makes this time of the year bad is that it isn't really that time yet.

I guess I should explain. This is the January issue of THE RAINBOW, but it comes out in mid-December. However, in order for me to meet the deadlines that have been imposed, I have to write it in early to mid-November. So, while I am trying to project myself a month ahead — it is a little hard to do. I'll try.

Because this is the January issue, I think it is important to look at the year which has just ended (or is about to end) and the one that is coming up. First, a few observations about 1984:

George Orwell's society did not take us over during 1984, as neither I nor you really thought that it would. At the same time, we did see computers and machines doing more and more things for people than ever before.

The computer business, in particular, was a good and a bad one. It was good for those of us interested in the CoCo because tens of thousands of users were added to the ranks. At the same time, more and more people looked at the Color Computer for the first time and this has made it what may very well be the most popular low-cost computer going.

For some other people the computer business has not been particularly good. We keep hearing about "the shakeout" — and a lot of people "got shook out." Computer companies. Software houses. Magazines. I've written about all this before, so there is nothing new here. Just an end-of-year observation that Tandy Corporation/Radio Shack seems to be as strong or stronger than ever, while some other people seem to be weaker or non-existent.

Looking ahead, I see the trend continuing. The fact of the matter is that many of the companies which show "new computers" at big shows like COMDEX one year, are nowhere to be seen the next year. One case in point is close to home: Tano Corporation — which had a big display for its U.S. Dragon computer last year. This time around they are not even in the market.

Why don't a lot of these people succeed? That is one of the concerns I think needs to be answered in 1985. And, frankly, I think the answer is that they do not succeed because they don't have anything new that will really grab the market.

The same goes in software. And magazines. No one is going to make inroads into an established market unless they can build a better mousetrap. Someone once wrote a book entitled *To Catch A Mouse, Make A Noise Like A Cheese*. It was a good book and it makes a lot of sense. But, you have to have a better cheese than the guy who has been selling you a perfectly good wheel of cheddar for a couple of years, or why would anyone switch? Too many people in the computer market are expecting people to switch simply because they have arrived on the scene.

What we need in 1985 are new things. New computers. New software. And not just new software, but new concepts. New ideas. I remember when *VisiCalc* first came out — it was the first program that gave the businessperson something he could really use. Apple Computer Co. sold a lot of computers thanks to ads which showed *VisiCalc* running.

I hear that several people are working on new endeavors in a lot of areas. I hope the trend continues and makes it to the marketplace. New programs will make your CoCo an even better investment — you'll be able to do more. And, of even more significance, you'll be able to do things you did not consider it possible to do. That's truly significant.

I see something new coming from a hardware standpoint, too. Whatever comes from Radio Shack will, undoubtedly, be upwardly compatible. That is something I have written about before, and it is a major strong point for the Radio Shack and Tandy line of computers.

In short, I see 1985 as an exciting year! I think it is a year in which the CoCo Community will continue to grow and the support for our favorite computer

## Telewriter-64. the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- **■** Easy hyphenation
- Drives any printer
- Embedded format and control codes
- Runs in 16K, 32K, or 64K
- Menu-driven disk and cassette I/O
- No hardware modifications required

#### THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

- Color Computer News, Jan. 1982

#### **TELEWRITER-64**

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

#### 64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

#### 64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The  $51 \times 24$  display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

#### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

#### FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette autoretry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor...
outstanding in every respect.
— The RAINBOW, Jan. 1982

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Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.





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FILEIII - Data Management System With FILEIII you can create and maintain records on anything you choose. Recipes, coupons, household records, financial records - you name it. You create records containing up to five fields you define. You can search, sort, modify, delete, save on tape and display on the screen or send to a printer. The program is user friendly and user proof. Prompting is extensive. A comparable program could cost much more. This one is a bargin!

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PROGRAM FILE (Reviewed in Oct. '83 Rainbow) Organize your cassette programs. With PROGRAM FILE you create a file of your computer programs. You can search, sort, modify, add, delete, save on tape, and display on screen or printer.

Cassete 16K EXT - Postpaid

Cassette 16K EXT - Postpaid



INTRODUCING! - CODE CONVERTER Secrurity System CODE CONVERTER will protect your basic and ML programs from unauthorized use. A simple code of your choice encodes your programs. Basic program listings will be scrambled and inoperative. Machine Language will not operate. Coded programs can be copied but are useless untill properly decoded.

Cassette 16K EXT - Postpaid



ADVENTURE STARTER (Reviewed in Feb.'84 Rainbow) Learn to play those adventures the painless way. You start with a simple adventure and move into an intermediate. Two complete seperate adventures plus hints and tips on adventuring. Finish this and you are ready for ATLANTIS!

Cassette 16K Ext - Postpaid



ATLANTIS ADVENTURE (Reviewed in May'84 Rainbow) This one is tough! We challenge you to complete this in 30 days! If you can we will send you any program we sell Postpaid - at absolutely no charge. You start on a disabled sub near the lost city of Atlantis. You must get the sub (and yourself) safely to the surface. Cassete 16K EXT - Postpaid



ESPIONAGE ISLAND ADVENTURE (Reviewed June'84) You have been dropped off on a deserted island by submarine. You must recover some top secret microfilm and signal the sub to pick you up. Problems abound in this 32K adventure.

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will continue to expand. I believe newer and better things are on the horizon. And, with the Color Computer on sale now, almost everyone has a chance to buy the best single machine available, dollar-for-dollar, on the market today. I hope you will do your friends and neighbors a favor and expose them to your CoCo in the days before and those following the holiday season.

I should also mention that RAINBOWfest in Irvine, Calif., will be in February. These shows are always a great deal of fun, as well as an opportunity to see the CoCo Community at its best. We have special rates at the Irvine Marriott for the show and hope that thousands of you will join us in sunny, Southern California for the midwinter

There are a host of seminars and lots of exhibitors planning to attend. So, check out the registration form in this month's issue and let us know that you will be

Last, but certainly not the least, this is the most appropriate time of the year to say "thank you" to the tens of thousands of you who are members of the CoCo Community, who support THE RAINBOW, and who use and love your Color Computer. We started this magazine three and a half years ago with the idea of serving people who owned a CoCo, even though it didn't yet have that nickname.

We have been able to serve you, I feel, largely through your support of us — writing or calling us with suggestions; telling advertisers that you saw their ads in the magazine; submitting programs for publication; participating in our contests; and a whole host of other things. We truly could not have THE RAINBOW without each of you.

I hope this season of the year is a happy, healthy and prosperous one for you and yours. I look forward to being with you for an even better year ahead.

Happy Holidays and happy 1985.

- Lonnie Falk

One-Liner Contest Winner . . .

This shows how the notorious "PMODE4 color artifacts" create a color picture on your set from what is really a black and white video signal. It's also very nice to look at.

> Mike Napolitan W. Springfield, MA

#### The listing:

1 DIMA(11):W=20:FORC=4TO5:PMODE4 ,1:PCLS:SCREEN1,1:GET(4,4)-(24,2 4) A.G:FORX=C TO228STEP2:Y=X\*.75 : Z=174-Y: BUT (X, Y) - (X+W, Y+W), A, NO T:PUT(X,Z)-(X+W,Z+W),A,NOT:PUT(X ,86)-(X+W,1Ø6),A,NOT:NEXT:FORT=1 T0500: NEXTT, C: FORB=1T09999: NEXT

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)



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#### WORLD'S SMARTEST TERMINAL

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#### GOOD LOOKIN'

AUTOTERM shows true upper/lower case in screen widths of 32, 40, 42, 51, or 64 characters with no split words. The width of 32 has extra large letters. Scrolling is forward, backward, and fast. Block graphics pictures are displayed automatically and can be scrolled.

The screen's top line shows operating mode, unused memory size, memory on/off, and caps-lock on/off. It also gives helpful prompts.

#### SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 46,600 characters (34,900 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

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#### **BUILDING JANUARY'S RAINBOW**

#### Rainbow 'Excellent' Or 'Good' Say 98.8 Percent . . . Some 94 Percent Have 32K, Most 64K... Two-Thirds Frown On Three Column Listings...

Then we decided to conduct a poll of those attending the Princeton RAINBOWfest, we knew that in order to get useful information from a survey you have to ask the right question — and that asking the right question is tricky business. Nonetheless, knowing full well we should consult an expert, such as the University of Cincinnati's Dr. Sam Sherrill, whose advice has appeared in RAINBOW, we instead gathered an ad hoc committee of those not busy on something else and developed questions based on a popular, if not professional, technique: "Hey, I know, let's ask how . . . '

Well, the results of the Princeton poll are in, and I believe we learned several things of value in addition to a great deal about taking future polls. In evaluating the results, we have kept in mind that those attending RAINBOWfest cannot be presumed to represent the entire RAINBOW readership. That is, as a group, those who came to the show were probably among the more dedicated users — likely more sophisticated in terms of hardware and software than readers who did not attend. After all, those attending traveled, on the average, some 136 miles to attend the Princeton show.

So, further caveats aside and with apologies to Sam, here (reported in percentages of those responding) are the highlights of what we found:

#### 16K ..... 5.9 32K ..... 12.6 64K ..... 81.2 BASIC: Color..... 4.7 Extended . . . . . . . . . . 54.9 Printe Mak Type Displa Kind DOS Disk OS-9 FLE Star-Softw

Present System:

Size:

Extended
Disk 40.4
Printer:
Make: Radio Shack 54.2
Other 45.3
Type: Dot Matrix 86.6
Letter Quality 8.1
Color 2.8
Other 2.5
Display:
Kind: B&W TV 16.0
Color TV 65.2
TV/Video Monitor 8.8
Computer Monitor 10.1
DOS Used:
Disk BASIC 84.0
OS-9
FLEX 2.5
Star-DOS 1.5
Software Most Likely To Buy:
Utilities 23.0
Games 19.3
Word Processing
Home Uses 14.1
Education 13.0
Art/Graphics 11.0
Business 1.5
Music 0.6
tems Most Interested In Buying:
Disk Drives 17.8

4K ..... 0.3

More Memory 13.4
Printer 12.1
Modem 10.2
Speech/Sound Synthesizer 10.0
Monitor 7.5
Graphics Tablet 6.2
New Operating System 5.6
New Operating System 5.6
Expansion Unit
CP/M Adapter 4.1
Joysticks
Remote Device Control 2.8
Videodisc Player 1.9
I Rate THE RAINBOW:
Excellent 80.8
Good 18.0
Fair 1.1
Poor 0.1
Average Number of Recent
Purchases Through RAINBOW Ads:
Total
I would like to see THE RAINBOW offer
more:
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File in the Projects

Educational Programs ...... 11.0

Business Programs ..... 10.5

Reviews ..... 10.2

Tutorials . . . . . . . . . . . . . . . . . . 10.1 Games . . . . . . . . . . . . . . . . 8.6

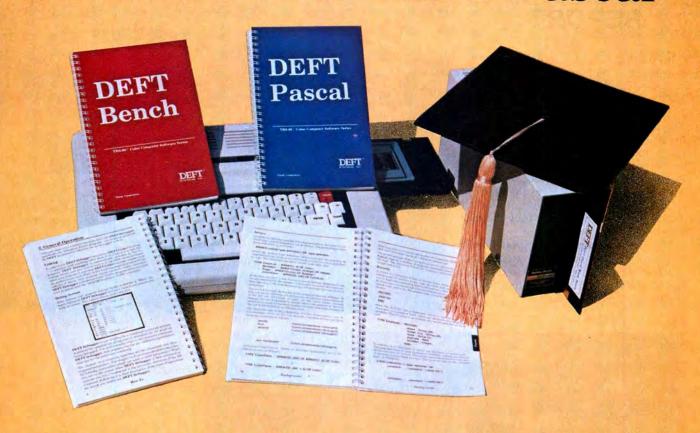
Just right ...... 72.5

Too short . . . . . . . . . . . . 4.9

I think your Product Reviews are:

(Continued on Page 176)

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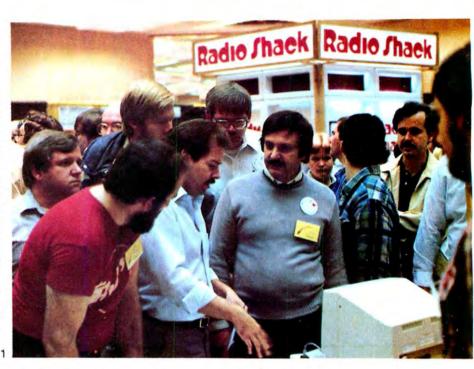
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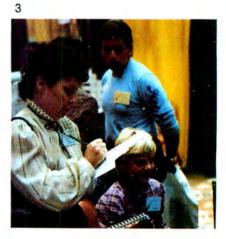
#### RAINBOWfest REPORT

Bright lights and a crush of people crowded the Computize booth throughout the run of RAINBOWfest-Princeton, Sept. 28-30, as Ken Klosinski and his crew made "video snapshots" of show-goers using the Graphicom Video Digitizer. Meanwhile, Frank Hogg and his helpers were showing off "Nomad," a little personal robot that rode around under CoCo control. Bob Rosen, of Spectrum Projects, seemed to have more show special signs than anyone could be expected to read. But, it was our RAINBOW readers who really took the cake — birthday cake.

We've been sworn not to repeat Lonnie Falk's age, so, we'll only state it one time that he'd just turned 42. He wanted to celebrate the occasion with those attending RAIN-BOWfest — thus, cake for all.













We have no statistics on how many dozen eggs, pounds of sugar or cups of flour went into the cake that served thousands, but if it's numbers you want, we have compiled the results from the survey we made of those attending "CoCo's very own show." For the highlights, see Jim Reed's column on Page 16 of this issue. A name was drawn from those responding to the survey and Michael J. Clancy, a real estate consultant from Jessup, Md., won himself a color graphics printer, just for filling out the survey form.

Was this a show for computer die-hards? Well, while Julie A. McGee, director of software development for Tandy Home Education Systems, drew a full house as keynoter at the CoCo Community Breakfast, Saturday morning, one of the most celebrated students from nearby Princeton University, Brooke Shields, went almost unnoticed by the CoCo crowd as she brunched Sunday morning in the hotel coffee shop.

As with all our RAINBOWfests, the Princeton show ran at an accelerated pace in order for everyone to meet as many people, exchange as much information, and interact as much as possible in our brief time together. And, nobody worked harder than Jerry Behler and the members of the Penn-Jersey Color Computer Club, who helped us publicize and run the show. Our thanks, Penn-Jersey, for helping, and our thanks to all the many CoCo clubs and individuals whose attendance makes these shows possible.

Next stop, Irvine, Calif. We do hope you'll join us.















The Pictures: (1) Al Alberta draws a crowd at the PBJ, Inc. booth. (2) Jack Torres of Computer Plus shows a new printer to Hot CoCo publisher Jeff Detray (blue shirt). (3) A computing family takes note of a bargain at one of the many vendor display booths. (4) Claire Manfredonia apparently caught her fingers in a joyport during a voltage surge. (5) Programmer Bill Dunlevy (Cashman, Time Bandit) worked with the MichTron crew. (6) One of Bill's programs gets a workout from a young challenger, one of 8,600 attending the Princeton show.

(7) Tandy's Julie McGee with Rainbow's Lonnie Falk at the CoCo Community Breakfast. (8) Also at the head table, Cheryl Blyn, of Computer Island, (left) with Sugar Software's Susan Davis. (9) Nearly 500 attended the breakfast, Saturday morning. (10) While the CoCo crowd was upstairs in the exhibit hall, Brooke Shields and her mother went almost unnoticed at brunchtime Sunday in the Hyatt coffeeshop. (11) Artist Paul Hoffman helps out at Owl-Ware. (12) Even the merchandise was friendly at the Penn-Jersey display. (13) Al Timme of Hard Drive Specialists (formerly Compukit Corp.).

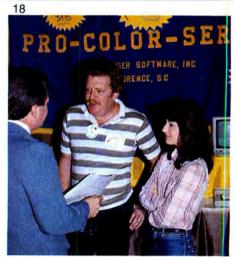


(14) RAINBOWfest is a good place to make a close examination of hardware products. (15) The milling crowd of CoCo enthusiasts (15) The milling crowd of CoCo enthusiasts filled the Regency Ballroom at the Hyatt. (16) Frank Hogg discusses *Dynacalc* with visitors to the FHL booth. (17) Bob Beckett responds to a roving CoCo crew. (18) It's hard to beat this CoCo artistry. (19) Paul Kush fields a question at Derringer Software. (20) Pat Endicott had a bargain corner at Endicott Software. corner at Endicott Software.









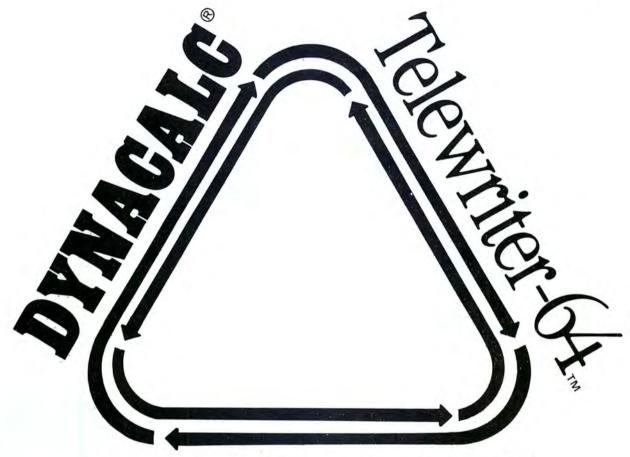
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## It Is Better To PUT Than To GET

#### By Alexander B. Trevor

little experience with Extended Color BASIC graphics will make it obvious that by far the fastest way to place graphics elements on the screen is with the PUT statement. In fact, it is almost the only way to implement any kind of animation on the Color Computer in BASIC. Most descriptions of PUT tie its use to the GET statement, although this does not have to be the case, as we shall see. (Radio Shack's Going Ahead With Extended Color BASIC, pages 67-71, and Color Computer Graphics," by William Barden, Jr., pages 143-154 are two examples). This is not too surprising, since the two statements are intended to be complementary. The idea is the GET will copy graphics data out of a specified rectangular area on the graphics screen, and save it in an array. The PUT statement allows you to place the data back on the screen at the same or another location.

In a typical game application, a number of "sprites" (such as rockets, robots, lunar landers, etc.) will be defined at the beginning of the program and then used with *PUT* statements throughout the game. The usual method of defining the sprites is to use the *DRAW* command to (slowly) draw each sprite on the graphics screen; then, each sprite is stored in a separate array with the *GET* command.

There are several problems with this method, though none of them may be serious in many applications: first, the *DRAW* command must be done on a separate graphics page, or it will deface anything that is already on the page. This is an important consideration for graphics editors, which may allow you to work on an image already in graphics memory, but not important in any program that clears the graphics page upon start up. Second, if there are many items to be drawn, the setup process can cause a noticeably long delay. Third, after *GETting* graphics into an array the contents of the array become "invisible," and

(Alexander Trevor, who holds a master's degree in electrical engineering, is executive vice president of Computer Resources at CompuServe, and is a member of the IEEE and the ACM. In his "spare time" he writes software for CompuServe's DEC-10 mainframes and for a variety of microcomputers.)

cannot be printed to the screen, tape or disk. The GET command purposely trashes part of the array header to cause this undesirable side effect.

The method described here avoids these problems through an alternate way to load arrays with graphics data that can be used in a *PUT* statement. To use this technique, it is necessary to understand the format that data is stored on the screen, and also the nature of arrays. Rather than attempt to describe all the possibilities, I will limit this discussion to *PMODE 4*, the high resolution mode consisting of 256 horizontal elements (pixels) and 192 pixels vertically. The technique is easily extended to other graphics modes.

In *PMODE 4*, each byte in the graphics page contains eight pixels along the horizontal. Since there are 256 pixels on each line, it takes 32 bytes to hold the first line. There are 192 lines in the entire picture, or 6,144 bytes. Data for *GET* and *PUT* is stored in a similar scheme. If you *GET* a 5 x 4 area into an array, you are storing 5 x 4, or 20 pixels. In this case one pixel requires one bit of storage. The pixels are stored tightly packed in the array, with the upper left hand pixel stored as the most significant bit of the zero byte of the array. Since each byte can contain eight bits, this graphic will require only three bytes. For example a lowercase 'v' might appear on the screen like this:

Graphics Screen Area (5 horiz x 4 vert)

	Col	umn			
	1	2	3	4	5
Row 1:	1		( <b>a</b> )		1
Row 2:	1	ě			1
Row 3:		1	<b>:</b>	1	
Row 4:			1		

As stored in the array;

Byte 1: 1 0 0 0 1 1 0 0 (row 1) (row 2, 1-3)

Byte 2: 01 01010 0 (row 2, 4-5) (row 3) (row 4, 1)

Byte 3: 0 1 0 0 0 0 0 0 0 (row 4, 2-5) (fill)

Arrays in Extended Color BASIC consist of elements that are five bytes each. Five bytes are necessary to hold a floating point number with the precision used in ECB, but the five bytes have no bearing on the graphics use of arrays except to make dimensioning and loading more confusing. In the above example, the three bytes will fit easily into the five bytes that will be allocated to a single array element.

How do we get three bytes of data into the first three bytes of a five byte integer array element? First, we must find out the address of the array element with the VARPTR statement — one of the less frequently used BASIC commands. Then, we POKE the data into the memory locations reserved for the array. That's all there is to it! The array can now be used in a PUT.

To see how this works in practice, let's follow through the example of a lunar lander sprite as shown below. The sprite is drawn in a rectangular area on the graphics screen eight columns wide and seven rows high:

	Col 0	umn 1	2	3	4	5	6	7 \	Hex /alue
Row									00
_1:	•	8.0	1	1	1	1		•	2C
Row									
2:		1	1	1	1	1	1		7E
Row									
3:		1	1	1	1	1	1		7E
Row									
4:		1	1	1	1	1	1	,	7E
Row									
5:			1			1			24
Row									
6:			1			1			24
Row									
7:		1	1			1	1		66

In this example, it is particularly easy to determine the value to be poked into the array because the graphics area is exactly eight pixels wide. Thus, an entire row of pixels fits exactly into one byte of the array. In cases where the rectangle width is not a multiple of eight (such as the example of the lowercased 'v' above), you may wish to draw the graphic on the screen using any method (DRAW command, or graphics editor), then use the program given in Listing 1 to print out the appropriate values.

Listing 2 is a complete example for the "PUT without GET" technique. In Line 20, four graphics pages are reserved. Line 30 sets the horizontal and vertical size of the array. These values (HSIZE and VSIZE) are then used to DIMension the array LL. HSIZE\*VSIZE is the number of pixels; this is divided by eight bits per byte and five bytes per array element (i.e., 40), and rounded to the next integral byte. A subroutine to load the graphics array LL is called from Line 50, while lines 60-90 simply PUT the element on the graphics screen. The symbol setup routine (lines 100-170) is the key to the technique. In Line 110, all variables to be used within the subroutine are referenced. This is absolutely necessary in order to prevent the location

of the array from changing after the VARPTR statement. If an undefined variable is encountered by BASIC, all variables are relocated in memory, invalidating the address returned by the VARPTR statement in Line 120. With an accurate address for the zero element of LL in variable P, the data is POKEd into each byte of the array in Line 150. In a variation of this method, the graphics data can be read in from disk or tape rather than from the DATA statements.

I have found this technique particularly useful for programs that use a number of sprites, and in which it was desirable to reduce the setup time to a minimum. Next time you want to speed up a graphics program, *PUT* something you didn't *GET*. You'll be rewarded with a faster program.

#### Listing 1:

10 ' PRINT DATA FOR A "PUT" 20 'USE AFTER DRAWING GRAPHIC 30 X=100: Y=100 'UPPER L CORNER 40 HSIZE=8 'SET HORIZONTAL SIZE 45 VSIZE=7 'SET VERTICAL SIZE 50 DIM LL(HSIZE\*VSIZE/40+1) 55 'VARIABLES MUST BE REFERENCED 56 'BEFORE CALLING VARPTR 60 I=0: P=0: J=0 70 GET(X,Y)-(X-1+HSIZE,Y-1+VSIZE ), LL, G BO P=VARPTR(LL)+12 90 FOR I=0 TO HSIZE\*VSIZE/8-1 100 IF J=0 THEN PRINT:PRINT"DATA \*\* = 110 PRINT HEX\$(PEEK(P+I)); 120 IF J>6 THEN J=0 ELSE J=J+1:P RINT"."; 130 NEXT 140 PRINT"0" Listing 2: 10 ' GRAPHICS PUT WITHOUT GET 20 PCLEAR 4: PMODE 4 30 HSIZE=8: VSIZE=7 40 DIM LL(HSIZE\*VSIZE/40+1) 50 GOSUB 100 60 PCLS: SCREEN 1,1 70 X=100: Y = 10080 PUT(X,Y)-(X-1+HSIZE,Y-1+VSIZE ),LL,PSET 90 GOT090 100 'SYMBOL SETUP SUBROUTINE 110 I=O: T\$=" ": P=0 ' MUST USE VARIABLES BEFORE VARPTR! 120 P=VARPTR(LL(0)) 130 FOR I=0 TO HSIZE\*VSIZE/8-1 140 READ T\$ 150 POKE P+I, VAL("&H"+T\$) 160 NEXT 170 RETURN

180 'LUNAR LANDER SYMBOL

190 DATA 3C,7E,7E,7E,24,24,66

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64K Required for math package & mail merge

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By Tim Nelson

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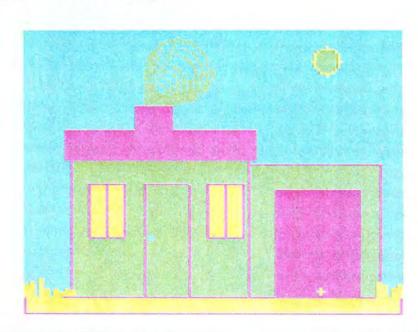
#### Home Sweet Home

#### By Marlene Fearing

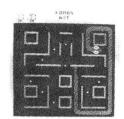
his program draws a house, a sun and a garage. It opens and closes the garage door, the front door opens and a figure appears and waves. Afterward, the door closes, the grass grows, and smoke comes from the chimney.

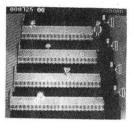
This is the first computer program I wrote after getting my computer. I hope it will encourage others to experiment with graphics and animation; it was a lot of fun to create. This program will work with 16K Extended BASIC with tape, or with a disk drive system. Just type it in and watch it draw.

(Marlene Fearing is a student at Pima Community College in Tucson, Ariz., where she is studying for her A.A.S. as a small business computer specialist.)

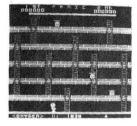


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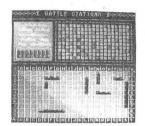
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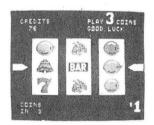
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```
75 LINE (96,164)-(102,179), PRESE
23 LINE (82,104)-(112,180), PSET,
                                       76 LINE (96,140)-(102,140), PRESE
24 LINE (76,52)-(100,68),PSET,BF
25 CIRCLE (84,140),2,2
                                       77 LINE (86,140)-(86,130), PRESET
26 PAINT (44,160),1,4
                                       78 LINE (102,112)-(112,104), PRES
27 PAINT (169,176),1,4
                                       ET
28 CIRCLE (200,176),3,2
                                       79 LINE (102,112)-(102,190), PRES
29 PAINT (204,22),1,2
3Ø PAINT (56,12Ø),2,4:PAINT (133,
                                       ET
                                       8Ø LINE (102,190)-(112,180),PRES
120), 2, 4
                                       ET
31 LINE (56,1Ø4)-(56,14Ø), PSET
                                       81 LINE (Ø, 18Ø)-(255, 191), PSET, B
32 LINE (136, 104) - (136, 140), PSET
                                       82 CIRCLE (86,14Ø),3,3
           TO OPEN AND CLOSE GAR
33 '
                                       83 COLOR 2,1
AGE DOOR
                                       84 PAINT (3Ø, 188), 2, 4
34 FOR X=1 TO 500:NEXT X
                                       85 PAINT (232,188),2,4
35 PAINT (190,179),2,4
                                       86 '
36 FOR X=1 TO 1500:NEXT X
                                       87 '
                                                TO DRAW GRASS
37 PAINT (176,110),4,4
                                       88 '
38 CIRCLE (200,176),3,2
                                        89 POKE 65495,Ø
39 LINE (Ø,18Ø)-(255,191),PSET,B
                                       9Ø DRAW "BMØ, 18Ø; R1; U8; R2; D8; R2;
         TO OPEN AND CLOSE FRONT
 DOOR AND FIGURE TO WAVE AND GO
                                       U10; R2; D10; R3; U12; R2; D12; R3; U5; R
                                        2; D5; R3; U5; R2; D5; R2; U3; R2; D2; R2;
BACK INSIDE
                                       U4; R2; D4; R2; U3; R2; D3"
41 LINE (92,112)-(92,190),PSET
                                       91 DRAW "BM238, 180; U10; R2; D10; R3
42 LINE (92,190)-(112,180),PSET
                                        ;U8;R2;D8;R4;U6;R2;D6;R2;U8;R2;D
43 PAINT (185,19Ø),1,4
                                        8;R1"
44 PAINT (10,185),2,4
                                       92 7
45 LINE (92,112)-(112,104), PRESE
                                        93 'SMOKE STARTS HERE
46 PAINT (185,190),2,4
47 LINE (92,112)-(92,190), PRESET
                                       95 X=82:Y=52: 'CIRCLE CENTERPOIN
48 LINE (92,190)-(112,180), PRESE
                                        96 SP=Ø:EP=Ø 'CIRCLE RADIUS
49 LINE (Ø, 255) - (255, 18Ø), PSET, B
                                        97 FOR R=1 TO 35 STEP .Ø5 'CIRC
5Ø FOR X=1 TO 12Ø:NEXT X
                                        LE RADIUS
                                        98 EP=EP+.02: IF EP>1 THEN EP=0
51 LINE (102, 112) - (112, 104), PSET
52 LINE (102,112)-(102,190), PSET
                                        99 CIRCLE (X+R,Y-R),R,1,1,SP,EP
53 LINE (102,190)-(112,180),PSET
                                        100 NEXT R
54 PAINT (96,124),1,4
                                        101 '
                                       102 '
55 CIRCLE (96,124),7,Ø
                                                   TO TURN BACKGROUND TO
                                        NIGHT
56 LINE (96,130)-(96,164), PSET
57 LINE (96,164)-(84,179),PSET
                                        103 '
58 LINE (96,140)-(84,140), PSET
                                       104 PMODE 4.1
59 LINE (96,164)-(102,179),PSET
                                       105 SCREEN 1,0
60 LINE (96,140)-(102,140),PSET
                                       106 CIRCLE (204,22),10,5
61 LINE (86,140) - (86,130), PSET
                                       107 PAINT (208,22),5.5
62 FOR X=1 TO 300:NEXT X
                                       1Ø8 '
                                                    REDRAWN SMOKE STARTS
63 LINE (86,140)-(86,120), PRESET
                                        HERE
64 FOR X=1 TO 500:NEXT X
                                        109 X=82:Y=52:
                                                         'CIRCLE CENTERPO
65 LINE (86,14Ø)-(86,13Ø),PSET
66 FOR X=1 TO 150: NEXT X
                                                        'CIRCLE RADUIS
                                        11Ø SP=Ø:EP=Ø:
67 LINE (86,140)-(86,130), PRESET
                                        111 FOR R=1 TO 35 STEP.Ø5 'CIRCL
68 FOR X=1 TO 150:NEXT X
                                        E RADUIS
69 LINE (86,140)-(86,130), PSET
                                       112 EP=EP+.02: IF EP>1 THEN EP=0
7Ø CIRCLE (96,124),7,1
                                        113 CIRCLE (X+R,Y-R),R,1,1,SP,EP
71 LINE (96,130)-(96,164), PRESET
                                        114 NEXT R
72 LINE (96,164)-(84,179), PRESET
                                        115 POKE 65494,Ø
73 LINE (96, 140) - (84, 140), PRESET
                                        116 GOTO 1Ø
74 LINE (Ø,18Ø)-(255,18Ø),PSET
                                        117 END
```

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## EZ-Graphics — '85 Style

#### By Fred B. Scerbo Rainbow Contributing Editor

Editor's Note: If you have an idea for the Wishing Well, submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, but don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

ach of us often spends a great deal of time making New Year's resolutions which are quite often forgotten within several days of the pledge. Although I have some resolutions which I will try to work into my daily routine, one resolution which I really wanted to make was a pledge to those of you who still have only 16K Extended Color BASIC and have been left along the roadside during our last few "Wishing Well" articles. (The last three have all been for 32K.) While this does not mean that you won't be seeing the most requested sequels, such as "Rockfest II" and "Baseball Fever II," I figured that this would be a good time to offer all of you some shorter listings that will equally satisfy everyone from 16K to 64K. This will be a great relief to all of you who will want to key these listings

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.) in but may be too pressed to hammer in the really long ones during the hectic rush of the holiday season. Also, some of you may have just gotten a CoCo for the first time during the holiday season and odds are that more of you got 16K than 64K.

So, as a little New Year's gift for all of you CoCo enthusiasts, here are two short listings which I dare any friends you may have to equal in as few lines on an Apple II or Commodore 64. These are strictly for the fun of creating sharp graphics. Next month we will get back to some more serious wishes.

#### Who You Gonna Call?

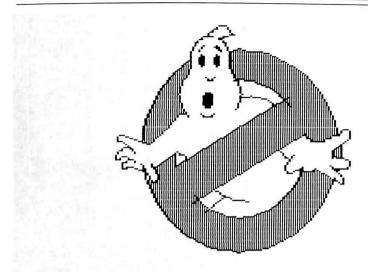
Probably one of the most successful motion pictures of the past summer movie season was the comedy, *Ghostbusters*. Besides being a funny movie, this cinematic effort has as one of its offsprings a symbol which is quickly becoming as common as "Rubik's Cube," Michael Jackson and "Cabbage Patch" dolls. Recently, I have seen this particularly catchy no-ghosts logo showing up on everything from T-shirts to bumper stickers. Well, here's one more place you can look to see this omnipresent poltergeist: on the screen of your CoCo.

Why even do this? Well, as I have said before, young CoCo programmers often take great pride in being able, with just a few program lines, to create graphics which are easily recognized. This eventually will serve to stimulate even the most inexperienced programmer to learn more, and eventually create a program which others can benefit from as well.

Therefore, Listing 1 is an extremely short program which will recreate the *Ghostbusters* logo in rather dramatic detail before your eyes. The actual body of the listing which draws the ghost and the slashed circle is only about 13 lines long. As I just mentioned, I doubt any Apple or Commodore programmers will be able to match this graphic on their machine in as few lines. This just gives you one more weapon to use in convincing others that you made the best choice when you chose a Color Computer.

The actual graphic uses PMODE 4 with an overlay of PMODE 3 (without using the SCREEN command). The ghost and slash are formed by a combination of semi-circle and DRAW commands, accounting for how efficiently this BASIC code can be written. You would need a little trigonometry to get similar results on the other computers.

One difference you will notice this time around is that I have used the Reset button to control the occurrence of red. When you RUN the program, if the screen is not red, press Reset and reRUN the program until it is red. Once it is red, press the ENTER key to draw the graphics. Most of my other programs usually offset a pixel to control the colors without using Reset, but since this was such a short listing, I figured



that the Reset was the quickest route to follow.

A final word should be mentioned here before we move on to our second listing. The actual Ghostbusters symbol is the property of Paramount Pictures which holds all rights for its commercial use. Therefore, this listing is for your own personal home use for the fun of it. and may not be used for any promotional purposes. (For example, if any of you were thinking of writing your own Ghostbusters game, you could not use this graphics or the logo as part of your effort.) However, no harm should come from using this listing for the fun of learning more about how your CoCo's graphics commands work. Consider it an educational experience.

Therefore, enjoy this little graphics gem, and let me know if you have any ideas for other similar efforts I might be

able to share in the "Well."

#### Sharing The Wealth (Of Graphics Skills)

In the last two installments of "The Wishing Well," I shared with you a technique of using checkerboard pixel patterns to create extra colors in PMODE4 (and PMODE3 as well). We saved these patterns in GET-PUT arrays, and painted them on the screen using the OR command found with PUT. Using this technique, any area which has previously been painted black will be filled in with the color found in our array. For a more detailed explanation of how these colors are generated, refer to last month's article.

There was one small drawback with the method used in last month's issue. While the technique was completely effective for what we wanted to accomplish with those football helmet graphics, the routines were not designed for you to easily use if you wanted to use the extra colors in your own drawings. As I promised, I have come up with a way that you could use them easily without having to do a great deal of graphics gymnastics. The method I have listed here will be a piece of cake to anyone who knows how to use the LINE command found in your Color Extended language.

Another limitation found in last month's version was the fact that the array covered nearly the full width of the screen. This would mean that your graphics would have to be drawn and colored in a fashion that would not allow you to have a yellow object next to a purple object, since the arrays would overlap each other on the same level. Therefore, these new routines have set up arrays which are only 16 pixels wide and two pixels deep. This allows greater flexibility in this type of painting when more than one color is desired on the same left to right level. It also takes up less than 10 percent of the memory required to do it the original way. The routines used for "Football 1 and 2" are much faster than this technique. Since speed was more important than flexibility, those were written with speed in mind. As always, you have the classic trade-off. Speed and flexibility are inversely proportional. This month we will emphasize flexibility instead, while sacrificing speed.

Therefore, the BASIC code required to efficiently and easily use these colors has been written to be part of the first 25 lines of your program. If you wish to draw graphics using them, you would simply start your own program lines at Line 100. There is a special syntax which I have developed to handle the colors which I will explain in just a few lines. Simply put, it is a new way of coloring, but at the same time will be very familiar to you.

Actually, the most difficult part of writing this program was thinking of what to draw as a graphics to demonstrate the routines. I didn't want to do a rock logo because those will be showing up in a couple of months, and there was

no reason to let the wind out of my sails for that one yet. Secondly, the colors would be of no use for the Ghostbusters graphics listed here. Besides, that would make it longer, defeating the whole purpose of doing the logo in the first place.

When the idea for what to draw finally came to me, I wanted to kick myself for not having thought of it in the first place. What is one of the first paintings or drawings that an aspiring young artist starts with? Why, of course, the answer was a bowl of fruit! Sure, it may not be as dramatic as the car from the ZZ Top logo of a few months ago, but it would give me the possibility of drawing and using more than one of these colors side by side.

With this in mind, I developed a set of seven additional color patterns to be included in the arrays. These patterns are set in lines 11-14 and put into the arrays in Line 15. The colors and their corresponding Syntax letters are listed below. Remember, the actual color may depend on how accurately your TV set tint is adjusted to red and blue.

Y = YellowB = Light blueG = Gold or orangeS = Silver or grayP = Purple (dark)L = Lime or dark blueV = Violet

The lime color is not really so much of a green, but depending on your tint, it is about as close as we can get. You will notice that I mentioned that the letters are part of the syntax. You will actually use these letters to call the colors as you

need them.

Remember how I mentioned that the syntax would be familiar to anyone who knew how to use the LINE command? As you may recall, the syntax for LINE

#### LINE (x1,y1)—(x2,y2),PSET

The variables x1,x2,y1 and y2 are used to define the starting and end points of a line (or box) using x and y coordinates on a field of 256x192 pixels. Therefore, if you wanted to draw a box with opposite coordinates of 10,10 by 20,20 you would write:

#### LINE(10,10)—(20,20),PRESET,BF

which would give you a box 10 pixels square painted in black (because of BF which means box filled). To paint this box with our new colors, you would use the same coordinates. These coordinates are placed in a STRING I call PAINT STRING which is identified as PT\$ in these routines. The syntax for

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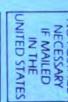
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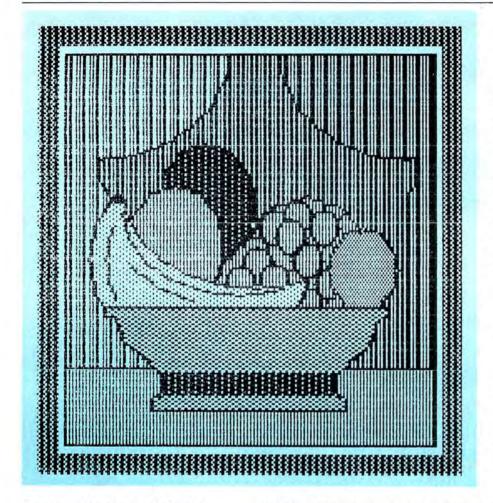
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these coordinates would thus be:

PT\$="Y010,010-020,020"

The Y stands for the color yellow. The next three digits are the coordinate for our x1 coordinate followed by a comma, with the next three digits being the y1 coordinate. We then use a dash and use three digits for x2, a comma, and three digits for y2. The coordinates for a box such as:

LINE(10,20)—(30,40), PSET, BF

would be:

PT\$="Y010,020-030,040"

In each case, we use this PAINT STRING by following it with the following command:

#### GOSUB 17

which takes care of the painting. You will notice that even though the numbers we are using are only two digit numbers, we must use three digits such as 010 for 10, or 006 for the number 6. This is necessary because the PAINT STRING is analyzed in lines 17 and 18 to determine the coordinates and

colors. This was much easier than to have you type in the values for five separate variables. If you accidentally use two digits rather than three, the painting will not take place. There will not be an error message. There will just be no painting. Thus, our syntax for PAINT STRING is:

PT\$="Color, Left Corner, Top Corner—Right Corner, Bottom Corner"

followed by GOSUB 17. All corner coordinates must be three digits. As you can see, if you know how to use LINE, you will have no trouble using PAINT STRING.

If you RUN the second listing called Seven More PMODE 4 Colors, you will have a very nice, framed painting of a bowl of fruit with drapes in the background. You will be pleased to see that this does make a very nice graphics to use for showing the colors available on your CoCo.

I did not use all seven colors here. Rather, I used just a few so you would get the idea. To get a nice curtain or draped effect, I used *POKE 178,x* to give a little added realism. Remember, the technique used for this is to use a value between zero and 255 with the

POKE and the PAINT using:

PAINT(x,y),,1

to get your striped colors. This was described many months ago in THE RAINBOW.

Lines 310 to 380 are designed to let you change *PMODE*s and *SCREEN*s to see how these patterns look under different combinations. Hitting the ENTER key will flip through the various combinations. I have also used Reset to control red in this program. If the screen is not red when you *RUN* it, press Reset until it is and then hit ENTER to continue. Again, I felt that this would be preferable to my other method since the Reset route is very popular, and you might find it easier since you may want to use these routines yourself.

Let's say you have RUN this program and now want to use these colors for your own graphics. Load in the pro-

gram and type:

**DEL 110**—

and hit ENTER. This will delete all following lines keeping the routines intact. It will also set your screen for *PMODE* 4 with *PMODE3* colors. You may wish to alter Line 100 to suit you needs. Since I have already used a number of variables in the routines, you will want to take care not to use these same variables! Here is a list of the variables which you should avoid:

 $\begin{array}{c} R,B,X,Y,G,S,P,L,V,LC,RC,TC,\\ BC,YY,ZZ \end{array}$ 

and the string variables: XX\$ and PT\$

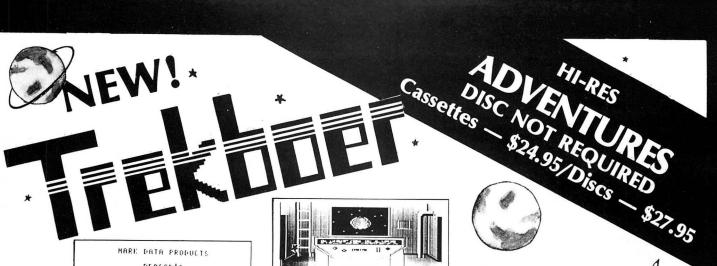
The variables R and B stand for red and blue, and you may substitute them in the program to suit your needs. I have chosen instead to use the values of 3 and 2 in the program so as to not bury you in variables.

If you wish to use these routines, you may renumber them, but you must leave the *REM* statements intact since this program is under copyright. Feel free to create using these techniques, but remember to give credit where credit is due! That's what makes it possible to share these techniques with you.

Let's try a little experimenting so you can see how this really works. Delete the first lines as I mentioned and type in the

following new lines:

110 CIRCLE(128,96),60,1,.9 120 PAINT(128,46),1,1 130 PT\$="Y068,042—190,150": GOSUB17 140 LINE(68,42)—(190,150) ,PRESET,B



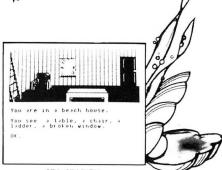




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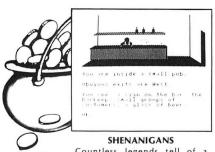
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#### 1000 GOTO1000

This will draw a circle, paint it black, PAINT STRING it yellow, and surround it with a box that shows the area actually covered by the array. Thus, if you have an irregular shaped object and paint it black, you can fill it in with these colors just as you would with PAINT because we are using OR which checks to see if a pixel is set, and if it is not, it sets it to the pattern. You may also need to redraw around the object since the color will fill in any area it overlaps, which is black.

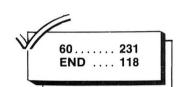
Although these new smaller arrays do mean you can have adjacent colors, be careful not to make the items too close together, as I tried to be sure of with the fruit. With a little experimentation, you will be painting with ease in no time at all. (In fact, you will most likely be seeing the routines and variations on them in upcoming graphics wishes. I mean, why shouldn't I take advantage of this easier method as well?)

In playing with the sample I have just given you, change the letter for the color in Line 130. This will give you a better idea of how to control the colors. Probably the hardest thing to color this way would be concentric circles. If you can handle that one, you can handle most any graphics. Yes, it can be done, but I won't show you how now. Let's see you try it yourself.

#### Conclusion

When I think of the types of graphics people originally got excited about when Color Extended came to the CoCo, and I see how far we have come with the very same machine, I can only imagine that things will continue to get more exciting. I started with Color BASIC with a \$499 16K machine and thought that block graphics were great back in 1981. Who would ever think we would be milking such detail out of this machine without really changing the original language? I'll keep searching for ways to make these things better. You just keep feeding me ideas.

Happy New Year and Happy Programming!



#### Listing 1:

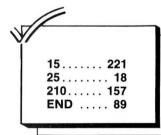
\*\*\*\*\*\*\*\*\* **GHOSTBUSTERS LOGO** 2 BY FRED B. SCERBO \*\* 149 BARBOUR ST.N.ADAMS.MA\* 5 COPYRIGHT (C) 1984 \* LOGO IS THE PROPERTY OF '\* OF PARAMOUNT PICTURES & '\* IS FOR YOUR HOME USE ONLY\* 9 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 10 PMODE4,1:PCLS1:SCREEN1,1:PMOD E3:R=3:PCLS3 2Ø IFINKEY\$<>CHR\$(13)THEN2Ø 3Ø PCLS4 4Ø CIRCLE(1ØØ,4Ø),2Ø,1,.9,.46,.Ø 5: DRAW"C4BM100, 24NU2R6DR2C1R4ER2 M+6,-1R2L3H6L6G2L2G2LG2DR3" 50 CIRCLE(100,62),30,1,.66,.41,. 63:CIRCLE(100,62),30,1,.66,.9,.1 :DRAW"BM-22,+24M+2,-4BR36M+2,+4F 2BM-16, -2ØF4M-6, -3R2BL12BUG4BD4B RD4F2U8F2D5BR9BUNU4F2U8F2D5BD8BL 4G2L4H2BD12BL2D6F2U1ØR2D1ØR2U1ØF 2D6BD6BR2G2L8H2BL16BU2F4H2L6" 60 DRAW"M-12,+10M-16,+10M-24,-6L 4G2D2R4M+1Ø,+6NF2H2L6G2L2G4D2R4E 2R4F2R4F2H2L4G2L4D4R4ER4M+1Ø,+2R 4NH4M+6,+8R4E2U2M-6,-8D2R4M+2Ø,-1ØF2R4F2D" 7Ø CIRCLE(138,8Ø),3Ø,1,.6,.69,.9 :CIRCLE(136,112),42,1,.5,.25,.4 80 DRAW"BM114,130M-18,+10" 90 DRAW"BM166,100F4R2F2NE4G4D2F2 R4M+9,-3F2R9E2M+24,+1ØR2U4M-12,-8M+3,+2R4NDR2NDR8E2U2H2M-14,-2ND U4M+8,-4ND8M+8,-4U4H2L4G4L2NU4L4

#### G2L4G2L12H2L2H2"

100 CIRCLE(128,98),92,1,.85,.52,.675:CIRCLE(128,98),92,1,.85,.74,.98:CIRCLE(128,98),92,1,.85,.05,.48
110 CIRCLE(128,98),62,1,.85,.74,.9:CIRCLE(128,98),62,1,.85,.05,.39
120 DRAW"BM68,110NU8M+104,-46BF20BD4BL4M-104,+46R2"
130 PAINT(78,36),R,1:PAINT(134,2

4),R,1:PAINT(218,100),R,1 140 PAINT(2,2),1,1:PAINT(134,50),1,1:PAINT(72,106),1,1:PAINT(92,136),1,1

15Ø GOTO15Ø



#### Listing 2:

<sup>7</sup> \* \* SEVEN MORE PMODE4 COLORS \* 3 BY FRED B. SCERBO \* 149 BARBOUR ST.N.ADAMS.MA\* 5 COPYRIGHT (C) 1984 **\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*** CLEAR1000:R=3:B=2 8 PMODE4,1:PCLS1:SCREEN1,1:PMODE 3:PCLS3 9 IFINKEY\$=CHR\$(13)THEN11ELSE9 10 'START COLOR SET 11 CLSØ:PMODE4,1:PCLSØ:SCREENØ,Ø :DIM Y(3),B(3),G(3),S(3),P(3),L( V(3):LINE(32,Ø)-(48,5),PSET,B 12 FORX=31TO47STEP4:PSET(X,Ø,Ø):

PSET(X+2,1,0):PSET(X+1,4,0):PSET

13 FORX=32T047STEP8:PSET(X.8):PS

 $(X+3,5,\emptyset):NEXT$ 

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P.O. Box 32228 • Fridley, MN 55432 OR CALL OUR 24 HOUR ORDER LINE 612-757-2439 ET(X+4,9):LINE(X,12)-(X+1,12),PSET:LINE(X+4, 12)-(X+5, 12), PSET:LI NE(X+2,13)-(X+3,13), PSET: LINE(X+ 6,13)-(X+7,13),PSET 14 PSET(X, 16):PSET(X+1, 17):PSET( X+4,16):PSET(X+5,17):PSET(X+1,20 ):PSET(X+5,21):NEXTX:PMODE3:COLO R2,3:LINE(32,24)-(48,24),PSET:LI NE (32, 25) - (48, 25), PRESET 15 PMODE4:GET(32,Ø)-(47,1),Y,G:G ET (32, 4) - (47, 5), B, G: GET (32, 8) - (4 7,9),G,G:GET(32,12)-(47,13),S,G: GET (32, 16) - (47, 17), P, G: GET (32, 20 )-(47,21),L,G:GET(32,24)-(47,25) , V, G 16 GOTO100: PAINTING ROUTINES 17 LC=VAL(MID\$(PT\$,2,3)):TC=VAL( MIDs(PTs, 6, 3)): RC=VAL(MIDs(PTs, 1 Ø,3)):BC=VAL(MID\$(PT\$,14,3)) 18 XX\$=LEFT\$(PT\$,1):IFXX\$="Y"THE N19ELSEIFXX\$="B"THEN2ØELSEIFXX\$= "G"THEN21ELSEIFXX\$="S"THEN22ELSE IFXX\$="P"THEN23ELSEIFXX\$="L"THEN 24ELSEIFXX\$="V"THEN25ELSERETURN 19 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16:PUT(ZZ, YY) - (ZZ+15, YY+1), Y, OR: NEXTZZ, YY: RETURN 20 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16:PUT(ZZ, YY)-(ZZ+15, YY+1), B, OR: NEXTZZ, YY: RETURN 21 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16: PUT (ZZ, YY) - (ZZ+15, YY+1), G, OR: NEXTZZ, YY: RETURN 22 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16:PUT(ZZ, YY) - (ZZ+15, YY+1), S, OR: NEXTZZ, YY: RETURN 23 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16: PUT(ZZ, YY) - (ZZ+15, YY+1), P, OR: NEXTZZ, YY: RETURN 24 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16: PUT(ZZ, YY) - (ZZ+15, YY+1), L, OR: NEXTZZ, YY: RETURN 25 FORYY=TC TO BC STEP2:FORZZ=LC TO RC STEP16:PUT(ZZ, YY)-(ZZ+15, YY+1), V, OR: NEXTZZ, YY: RETURN 90 'START YOUR PROGRAM HERE 100 PMODE4:PCLS1:SCREEN1,1:PMODE 110 PMODE4:COLORØ, Ø:LINE(Ø, Ø)-(2 54, 192), PSET, B: LINE(12, 8) - (243, 1 83), PSET, B: PAINT(2,2), Ø, Ø: PMODE3 120 PT\$="P000,000-255,008":GOSUB 17:PT\$="PØØØ, 182-255, 192":GOSUB1 7:PT\$="PØØØ,ØØØ-ØØ8,192":GOSUB17 :PT\$="P240,000-252,192":GOSUB17 13Ø GOSUB14Ø:GOTO15Ø 14Ø DRAW"BM4Ø,12ØC1ND4R17ØD4L4G4 D2G2D2G4L2G4L2G4L2G4D6F2R2F2D4L1 16U4E2R2E2U6H4L2H4L2H4L2H2L2H2U2

H2U2H4L4U4": RETURN 150 PAINT(50,122),1,1:PT\$="SØ36, 120-210,146":GOSUB17:PT\$="G062,1 48-214,156":GOSUB17:PT\$="SØ48,15 8-210,170":GOSUB17:GOSUB140 16Ø GOSUB17Ø:GOTO18Ø 17Ø CIRCLE(6Ø,1ØØ),3Ø,1,1.1,.4,. 7:CIRCLE(130,72),80,1,.5,.2,.5:D RAW"BM160,108C1D4G2D2G4":RETURN 18Ø PAINT(158,112),1,1:PT\$="YØ3Ø .Ø76-16Ø.118":GOSUB17:GOSUB17Ø 19Ø CIRCLE(12Ø,8Ø),7Ø,1,.5,.2,.5 :CIRCLE(114,72),8Ø,1,.6,.3,.4:CI RCLE(66,100),26,1,1.1,.4,.6 200 CIRCLE(100,76),30,1,.9:PAINT (100,58),1,1:PT\$="G069,048-120,0 98":GOSUB17:CIRCLE(100,76),30,1, .9,.6,.2 21Ø CIRCLE(82,94),30,3,.9,.58,.1 :CIRCLE(130,72),80,3,.5,.3,.47:P AINT(82,86),3,3:CIRCLE(82,94),3Ø ,1,.9,.58,.1:CIRCLE(130,72),80,1 ,.5,.3,.47 22Ø CIRCLE(194,1Ø4),22,1,.9,.33, .18:PAINT(194,98),1,1:PT\$="V168, Ø84-210,118":GOSUB17:CIRCLE(194, 104),22,1,.9,.33,.18:CIRCLE(160, 120),48,1,1,.6,.88:PAINT(160,100 ),2,1 23Ø CIRCLE(16Ø,12Ø),1Ø,1,1,.75,1 :CIRCLE(160,100),10,1,.9:CIRCLE( 150,90),10,1,.9:CIRCLE(170,86),1 Ø,1,.9:CIRCLE(14Ø,11Ø),1Ø,1,1,.5 ,1:CIRCLE(120,110),10,1,.9,.5,1: CIRCLE(130, 102), 10, 1, .9, .5, 1:CIR CLE(140,86),10,1,.9,.28,.92 24Ø CIRCLE(154,82),1Ø,1,.9,.53,. 96:CIRCLE(172,110),8,1,1,.15,.75 :DRAW"BM126,90C1R6F4D2BF8BR4R4BE 2ØBR6E4BL12BU2U2" 25Ø COLOR1,1:LINE(16,12)-(239,17 9), PSET, B: LINE (16, 146) - (66, 146), PSET:LINE(239,146)-(184,146),PSE T:PAINT(20,148),3,1 260 CIRCLE(36,10),80,1,.6,.02,.2 5: DRAW"BM36, 56C1D1@F6" 27Ø CIRCLE(222,1Ø),8Ø,1,.6,.25,. 49:DRAW"BM222,56C1R6D1ØG6D74" 28Ø POKE178,14:PAINT(18,2Ø),,1 290 POKE178, 26: PAINT (200, 20), 1 300 POKE178,34:PAINT(130,20),,1 310 IFINKEY\$<>CHR\$(13)THEN310 320 PMODE3:SCREEN1.1 33Ø IFINKEY\$<>CHR\$(13)THEN33Ø 340 PMODE3:SCREEN1,0 350 IFINKEY\$<>CHR\$(13)THEN350 360 PMODE4:SCREEN1,0 37Ø IFINKEY\$<>CHR\$(13)THEN37Ø 380 PMODE4:SCREEN1,1:GOTO310

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#### **Full-Screen Text Editor For BASIC Programs**

EDITTRON is a position-independent, machine-language program that enables you to perform full-screen text editing of your BASIC programs. EDITTRON has ten (10) Cursor-Control functions that allow you to move freely within your BASIC program text and ten (10) time-saving Screen-Editing functions. This BASIC programming aid also features Auto-Repeating keys, Key-Tone on command, user-friendly Prompts and Error Messages, All ROM Compatibility, no ASCII Conversion, 24 pages of comprehensive Documentation, and a Quick Reference Chart.

EDITTRON requires a minimum system of 16K RAM and Extended Color BASIC.

CASSETTE ......\$ 30 DISKETTE ......\$ 32

#### LISTER CROSS-REF VAR-DUMP

LISTER is a powerful programming aid that allows you to see and read your BASIC program in a New and Enhanced format we call a Logical-Listing. LISTER provides for Line-Number Margin, Statement-Splitting, Indented FOR-NEXT Loops and IF-THEN-ELSE statements. Uses the same LIST and LLIST commands as BASIC.

The CROSS-REF program generates listings of line-numbers and variables that are referenced within your BASIC program. Each entry will be followed by all of the line-numbers that reference that entry. Reference all or only one at a time. Alphabetic listing, Auto-Tab and Line-Number Wrap features enhance the readability of the CROSS-REF output.

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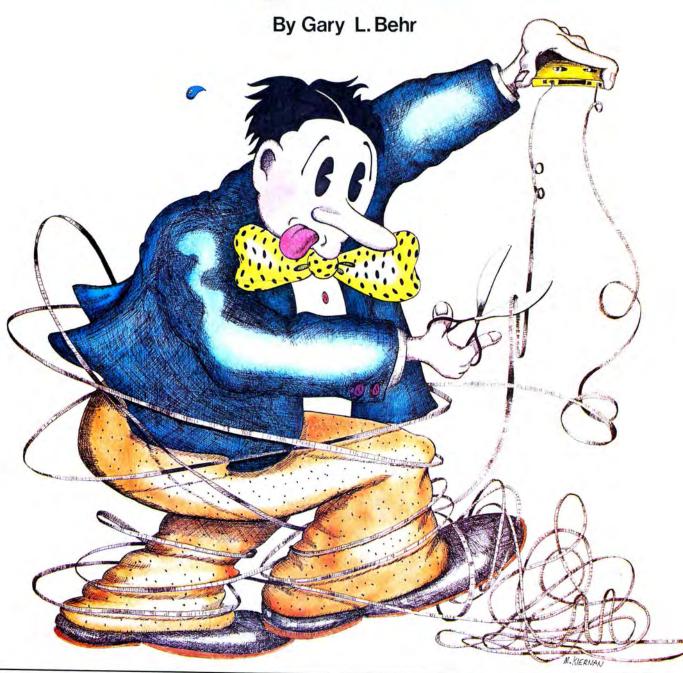


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through your cassette tape for a program, you've probably discovered it can
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either BASIC or Extended BASIC.

The Keyboard Cassette Editor program (KCE), used in conjunction with the suggested editing method will allow you to easily update or locate any program on any tape in a matter of seconds. This program is also quite useful for editing out unwanted programs from the middle of tapes and reducing search time to a minimum.

The advantage of listening to a recorded program is it allows a person to identify exactly where and how much space a particular program occupies on the tape. Once this is determined, its position can be noted in an index log using the tape counter for quick retrieval or editing rather than going through the entire tape in the "play-search" mode.

Saving programs from computer to tape isn't hard, neither is loading them back into the computer. What the instruction book doesn't tell you is how to manage and edit your tape once you've begun CSAVEing all your programs!

Before discovering AUDIOON: MOTORON / AUDIOOFF: MOTOR OFF, I was unplugging the cassette recorder jacks every time I wanted to listen to where a particular program started and finished. When I read the same results could be accomplished using computer keyboard commands

(Gary and his wife Linda own Expressive Image Photography Studio in Madison, Wis. Although Gary has no prior computer background; business needs necessitated the purchase this year of a computer system. The simple programs Gary has written are directed toward efficient computer usage and applications for his business.)

and listening to the tape through the television, life with a computer became a little easier. This also minimized the need to readjust the recorder volume control every time I listened and precluded the possibility of damaging one of the jacks.

Regrettably, not being a speed-typist, constantly re-entering AUDIOON: MOTORON / AUDIOOFF: MOTOR OFF became practically as challenging as plugging and unplugging the jacks. There had to be a better way.

"Saving programs from computer to tape isn't hard, neither is loading them back into the computer. What the instruction book doesn't tell you is how to manage and edit your tape once you've begun CSAVEing all your programs!"

I should first explain how I've set up my tape file. Each primary category of interest, such as: business, inventory, data, special programs, home, hobbies, games, etc., has a separate cassette representing "final" CSAVEs of each program. I also have a "pending" tape which represents the various programs I'm currently working on but do not yet have in final form.

With other CSAVE systems you have a choice of either adding on after the older version of the same program/data or recording over the older version. If you add the "updated" version after the previous version it won't be long before an entire tape has the same program in various stages of updates. If you attempt to record over the older existing version, several problems can arise. You can lose everything with an I/O Error by having a segment of the old version attempt to load with the new version (often caused by less than total erasure of the previous program). Another problem is since the updated version has more information in it, it's also longer and hence uses more tape length when CSAVEd, which could record over the beginning of the next CSAVE in the tape sequence.

My solution to these potential prob-lems has been very effective for hundreds of error-free CSAVEs. First. make sure your recorder is set up properly, including periodically cleaned heads. Second, take full advantage of the recorder's digital counter by zeroing it to the beginning of each tape and setting up a simple log sheet indexing each program to a specific counter value. When you CSAVE a program, anticipate the maximum length after all the updates are completed. An effective way to estimate is first to note the length of the original CSAVE on the counter. If you think you may end up with twice as much program/data before you're finished, then double the counter length value. After you've determined the maximum length of your program/data then add another five counter units as a buffer between CSAVEs.

If I CSA VEd a current inventory listing of merchandise and the CSAVE began at counter number(CN) 17 and ended at CN 27, I used 10 counter units for the CSAVE. Realizing I'm only half done with the current listing I'd have to add another 10 counter units. I may also want to consider if the current inventory will ever be expanded, so to be safe I'd add a 20 percent expansion factor or another four counter units. Now that I have determined the total space needed for a complete inventory, including an expansion factor, my total counter units are 24. Now add five counter units as a buffer between the next CSAVE for a grand total of 29. Since my program began on CN 17, I add 29 and when a new (different) program/data is saved on the same tape it will begin at CN 46.

At first this may seem like a lot of blank tape between programs, but compared to sequentially saving updates, it's much more condensed. With an accurate index log you'll be able to fast forward or rewind to the beginning of any program/data in a matter of seconds. And since the program/data always begins at the same place there is no need to revise the index log entries each time a change is made.

Once you have the KCE running, your screen display will give you three options: EDIT, STOP or QUIT. Pressing the 'E', 'S' or 'Q' computer key

will initiate each respective function (it's not necessary to use the uppercase SHIFT key). The 'E'dit key serves the same basic function as AUDIOON: MOTORON, the 'S'top serves as the AUDIOOFF:MOTOROFF and the 'Q'uit allows you to entirely exit the KCE program.

It is important to understand the 'O'uit also erases the KCE program, allowing immediate entry of new program information. (This should also be taken into account when initially writing the KCE program.) Because of the total exit from the program, when the 'Q'uit key is pressed you are then prompted with "DO YOU REALLY WANT TO QUIT? - YES, NO, BREAK". If you do want to quit just press 'Y', if not, pressing 'N' will re-enter you into the KCE program. If you wish to make a temporary "break" from KCE without erasing the program itself, just press the keyboard BREAK key and you can review your CSAVEs' names by using the BASIC SKIPF command. When you're ready to return to the KCE editor just enter RUN.

You may have noticed the 'E' and 'S' keys are directly adjacent to each other

and the 'Q' key is also nearby, which is not sheer coincidence. This position allows easy use for left hand access while the right hand remains free for cassette manipulation, writing notes or whatever. There isn't any need to watch which keys your depressing, as each function key has a beep response with a different tone to audibly confirm every input.

We'll use our previous inventory example to demonstrate the KCE program. Let's assume we've already loaded the inventory into the computer from the "final" cassette and updated the file.

#### CSAVE to "PEND":

CSAVE the updated version on a different, "Pend" cassette which we'll keep just for "pending" actions. Be sure to include at least one backup CSAVE (for convenience the CSAVEs can be done sequentially).

#### CLOAD "KCE":

Once satisfied the updated version is safely *CSAVEd*, *CLOAD* the *KCE* program and *RUN* it.

Ready the "Final":

Rewind the "final" cassette to the beginning and "zero" the tape counter. Now fast forward until you're positioned just before the "inventory" program, CN 12-15. Press Play on the cassette recorder and then press 'E'dit on the keyboard. The tape will begin to run and you should hear a faint hum from the blank "buffer" of the previous program as the tape advances. When the tape comes to CN 16 press 'S'top on the keyboard.

#### "CLEANING" the tape:

Place the recorder in the Record mode and press 'E'dit again. You are now replacing the old inventory program with a clean, blank tape space. Let the recorder "clean" the tape to the end of the full length of the anticipated program (which in this case was CN 46). When you 'S'top, you will not only stop the tape but also place a short audible "beep" on the tape for future editing orientation. (If you 'Q'uit the program while in the 'E'dit mode, the program will automatically turn off the audio and recorder without an orientation

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beep recorded on the tape.) Once you've established the tape parameters, subsequent updates will only require cleaning the tape a digit past the end of the previous version.

#### Position "FINAL" for CSAVE:

Rewind the cassette recorder back to about CN 15, and place the recorder in the Play mode. Press the 'E'dit once more until you are exactly at CN 17 and 'S'top the tape edit.

#### Reload your program:

Press 'Q'uit and answer the prompt with a 'Y' to totally exit the KCE program. Remove the "final" cassette from the recorder and reload your updated inventory into the computer from the "pend" cassette.

#### Naming your program:

Since you're permitted up to eight characters in your CSAVE "name", a thoughtful suggestion would be to reserve the last three characters for a two-character revision index and separate it with a period or slash such as "NAME/03". This not only allows easy

review, especially during a tape search, but also offers a simple transition to future disk SAVEs.

#### CSAVE to "FINAL":

Once loaded, return to the "final" cassette and *CSAVE* in the normal manner.

Rewind the "final" cassette to the beginning, "zero" the counter, advance to about CN 16 and CLOAD the same program you just CSAVEd. This reloading will confirm an effective CSAVE. (If the "final" CSAVE would have failed, you still have several CSAVEs on the "pend" cassette to try again.) By zeroing the counter before CLOADing the present program, you can determine how much additional tape the update consumed (if the tape now stopped at CN 32, the update portion consumed five additional counter units).

I realize this may sound a bit complex, but most of it is just a logical sequence and won't require much memory. The most obvious advantages are the exceptionally precise control a person has in advancing the tape, either in the Play or Record mode, the audible "beep" to determine the program/ data save boundaries and the ability to main-

tain concise, accurate and consistent records of program/data CSAVEs. In the long run it can be a very simple solution to what otherwise might become a complex maze of confusion.

Here's the KCE program. It's listed the Extended BASIC version, however by replacing the program subroutine with the alternate subroutine, the program will effectively run on Color BASIC.

For an effective screen display, please adhere to all spacing.

Line 170 lists NEW; however while you are initially writing the program replace NEW with END. This allows you to test RUN the program, including 'Q'uit without erasing the entire program. Once you have satisfactorily completed the program, CSAVE it for your backup file with the END command on Line 170. Then change Line 170 to NEW and CSAVE it a few times for normal editing use.

You may wish to begin your "pend" cassette with several KCE program CSAVES for fast access when editing. If you'd like a pre-CSAVEd KCE program on a 20-minute cassette with a copy of these usage instructions, please send your name and address along with \$8 to 6818 Odana Road, Madison, WI 53719.

#### Listing 1:

- 1Ø CLSO:REM"KCE-BY GARY L. BEHR"
- 2Ø A\$=INKEY\$
- 30 PRINT@100," KEYBOARD CASSETT E EDITOR"
- 4Ø PRINT@164, "PRESS"
- 50 PRINT@196, "<E> TO EDIT TAPE"
- 60 PRINT@228,"<S> TO STOP TAPE"
- 70 PRINT@260,"<Q> TO QUIT PROGR
- AM"
- 80 IFA\$="E"THENSOUND50,1:AUDIOON:MOTORON
- 90 IFA\$="S"THENSOUND150,1:MOTORO
- FF
- 100 IFA\$="Q"THEN110ELSE20
- 110 AUDIOOFF: MOTOROFF
- 120 SOUND200,2:SOUND180,1:SOUND2
- 00.1:GOSUB180
- 13Ø CLSO:PRINT@228," EDITING
- COMPLETED": GOSUB26Ø
- 14Ø FORT=1T01ØØØ
- 15Ø NEXTT

- 16Ø CLS
  - 17Ø NEW
  - 180 CLSO 190 A\$=INKEY\$
  - 200 PRINT@100, "DO YOU REALLY WAN
  - T TO QUIT?"
  - 210 PRINT@215," <Y> YES"
  - 220 PRINT@247," <N> NO"
  - 23Ø PRINT@279," <BREAK>"
- 24Ø IFA\$="N"THEN2Ø
- 25Ø IFA\$="Y"THEN13ØELSE19Ø
- 26Ø PLAY"P12;T4;V25;L4;G;V18;L8; C;L8;C;L4;D;L4;C;P4;V22;L4;E;V25
- ;L3;F
- 27Ø RETURN

#### Listing 2:

- 26Ø FORS=7ØTO23ØSTEP5
- 270 SOUNDS.1
- 280 NEXTS
- 290 RETURN



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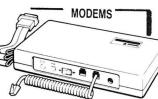
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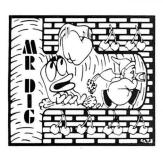


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- Laran Stardrake

## Binary Birthday Cakes, **Letters And** More Wordsworths

By Bob Albrecht and Ramon Zamora **Rainbow Contributing Editors** 

#### Basic Skills

asic Skills is a book by Herbert Kohl. It is a wonderful and thoughtful book — a book by a philosopher and doer who has spent his life learning from children about children. We wish that every person concerned about the growth and well-being of children would read this book.

From the introduction:

I believe in public education but do not believe that the public schools are providing an adequate basic education for our children. It is important to emphasize this distinction between public education and the current state of the public schools, between what

"School is in the Heart of a Child" is for parents of quite young children. We want to help you work and play with your three- to eight-year-old child and learn to use computers as a joyful family experience. We want to suggest ways to incorporate the home computer as another means to encourage your child's independence, growth, and control over his own life. See the pride on her face as she directs the computer to do what she with deliberation selects. See her head gears switch to "on" as she progresses stepby-step with your presence and caring di-

We will explore (we hope, with your help) the following:

- the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.

 Additional resources to consult: books. magazines, software publishers, networks, etc.

- Suggestions for interludes and fun times away from the computer (a must): call the librarian for specific information; watch a TV program together and discuss it; work together as volunteers in a community project; take a spring (or fall or winter or summer) awareness
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge. Let's share our experiences as we all learn from our children.

• Specific "teaching" techniques so that We also provide small programs you can type in and use right now.

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could be and what is. We can make a decent system of public education and help our children learn to take control of their lives rather than be managed, controlled, bossed, and bewildered. This book presents a concrete program for the revitalization of public education. It is based on the idea that the fundamental goals of public education should be to develop informed, thoughtful, and sensitive citizens who are able to fulfill their personal needs at the same time that they contribute to making the whole society harmonious and compassionate. We need this wholeness now more than at any time I can remember. It is

(Well-known author Bob Albrecht also writes the "Game Master's Apprentice" feature for The Rainbow each month. Ramon Zamora is author and coauthor of several books, co-founder of Computer Town USA!, and currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)

common to hear people talking about the United States suffering from "too much democracy," "an excess of freedom" and "unbridled liberty." It is time to take a serious look at ourselves and see how much democracy we really have and how far we have to go to achieve the dreams expressed by the Declaration of Independence, which dared to call life, liberty, and the pursuit of happiness rights and not privileges.

The focus of this book is on public education and the struggle to create decent schools for all of our children. I hope it will move people to stay engaged in that effort and to develop concrete programs for action in their own communities.

We suggest you get this book. If your local bookstore doesn't have it, order it directly from the publisher: *Basic Skills* by Herbert Kohl, from Bantam Books, Inc., 414 East Golf Road, Des Plaines, IL 60016, \$3.95 plus \$1.25 postage and handling.

#### Binary Birthday Cake

Remember your first birthday? Maybe the cake looked like this:



Well, on your second bithday there were two candles, on your third birth-day three candles, and so on. As we grow older, the number of candles gets embarrassingly large and harder to blow out.

Sooo . . . why not try a binary birthday cake?



ONE YEAR OLD



TWO YEARS OLD



THREE YEARS OLD



FOUR YEARS OLD



FIVE



SIX



SEVEN

With four candles, we can go up to 15 years old, with five candles, up to 31 years old and with six candles, up to 63.

But if you are 57, get people to look at the cake from the back instead of the front... in fact, if you don't put something on the cake to indicate the front, your age will be ambiguous (unless, of course, it is a binary palindrome!). And, for all you computer people out there—



FRONT: 57



**BACK: 39** 



A PALINDROME

How many candles would Methuselah need? How many candles would Gandolf need? How many candles would a dragon need?



Here is a cake with an extra BYTE



oining in the fun and excitement of RAINBOWfest is a great way to get to know the CoCo Community. Many of those who write for THE RAINBOW —and those who are written about — attend CoCo's very own show. It's a people-to-people event as well as a valuable learning experience.

For the 1984-85 season, we've scheduled three RAINBOWfests in three parts of the country. If you missed the RAINBOWfest in Princeton, N.J., why don't you make plans now to be with us in Irvine, Calif., or Chicago, III.? Each show will offer fun, excitement, new products, seminars and information for your CoCo! And for those who (perish the thought) don't like CoCo as

much as you, we've scheduled each RAIN-BOWfest in an area that will provide fun and enjoyment for the whole family.

Our Irvine, California, show is being held at the Irvine Marriott Hotel, which offers special rates for RAINBOWfest. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Our highly popular CoCo Community Breakfast will again feature a well-known figure from the Color Computer Community. And the exhibition will be interspaced with a number of seminar sessions on all aspects of CoCo — from writing in machine language to making your BASIC work better.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. Some with special programs and hardware items to introduce. Others with show specials.

Tickets can be secured directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest . . . help us all celebrate CoCo Community at its finest.

United Airlines and THE RAINBOW have joined together to offer a special discounted fare to those attending RAINBOWfest-Irvine. Simply by calling United at the toll free number listed below and identifying our meeting, with account number 522-I, you will be eligible for a 20 percent discount on the Easy Saver Fare. The only requirement is a Saturday night stay.

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RAINBOWfest-Irvine, California (L.A. area)
Date: February 15-17, 1985
Hotel: Irvine Marriott Hotel
Rooms: \$65 per night, single or double
Advance Ticket Deadline: February 8, 1985

RAINBOWfest-Chicago, Illinois Date: May 17-19, 1985 Hotel: Hyatt Regency Woodfield Rooms: \$49 per night, single or double Advance Ticket Deadline: May 10, 1985

## RAINBOWfest Irvine

#### Seminar Program And Speakers

Linda Nielsen

The CoCo Artist High Res Graphics

Linda, of Moreton Bay Laboratory, and several others active in the CoCo area, will demonstrate some graphics and help you to learn about some techniques you can use.

Dale Puckett

Beginner's Tour Of OS-9
Beginner's Tour Of BASIC09

A free-lance writer and programmer, Dale has worked with microprocessors since 1976, and is the author of *The Official BASICOS Tour Guide*. Dale will be available to sign copies of his new book, *The Complete BAINBOW Guide to OS-9*.

Bob Albrecht

School Is In The Heart Of The Child

Bob Albrecht, RAINBOW columnist who writes "School Is In The Heart Of The Child," is one of the most prolific authors in the microcomputer world today. A specialist in writing for beginners, he is the author of numerous books, including TRS-80 Color BASIC.

Jim Reed

**Writing For RAINBOW** 

Jim, managing editor of THE RAINBOW, will talk about how you can submit programs and articles to magazines for fun and profit. He is also senior editor of PCM — and editorial director of SOFT SECTOR (for the Sanyo).

- Bill Nolan
- Bob Albrecht

Dan Downard

Inside Your Color Computer Software And Hardware Interfacing

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 24 years through ham radio (K4KWT). His interest in computers began about five years ago and he has built several 68XX systems.

- Don Inman
- Tim Finger
- A Realizable Fantasy: The Home Dream Machine
- Bob Albrecht

Along with several other panelists

Don Inman is a co-author of a series of booklets for Radio Shack titled *Color Logo Guide for Teachers*. He is a former teacher and is presently a full-time author with the DYMAX group.

Tim Finger is a member of the DYMAX group, along with Don and Bob.

Wayne Day

Exploring CompuServe and the Color SIG

The CoCo User and the Local Bulletin Board

Wayne Day, a traffic engineering signal technician, is the SYSOP of The Color SIG of CompuServe, the world's largest consumer information service. He is also a certified paramedic and works part-time for an Emergency Medical Service provider. His amateur radio operator call sign is WA5WDB.

GameMaster's Apprentice And Dragon's Byte

Bill Nolan, who teaches "Programming In BASIC" at the college level, owns Prickly-Pear Software Co. and has written several commercially successful software packages.

•Ken Kaplan, president of Microware Systems Corp., will be our keynote speaker at the CoCo Community Breakfast, Saturday morning at 8 a.m.

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Also send me a hotel reservation card for ( ) Irvi	ne, or ( ) Chicago.
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COMPANY	
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My Account #	Ex. Date:

#### Adventure Games For The Rest Of Us

We are looking, mostly in vain, for easy-to-play Adventure games rated G. We are tired of games that depend on killing as the way to success. Last time we recommended Adventure Starter from Owls Nest Software, P.O. Box 579, Ooltewah, TN 37363. For 16K Extended Color BASIC. On cassette for \$17.95 postpaid.

We encourage all of you who want to try an easy Adventure game with your kids to get this Adventure and do it. Please share your experiences with us. We will continue playing MYHOUSE with kids and share our experiences with you. Why do we choose MY-HOUSE? Because it is the only nonviolent, easy-to-play Adventure game we know of for a 16K CoCo with Extended Color BASIC. As you play MYHOUSE, encourage your kids to make a map. Please send us maps of MYHOUSE and tell us about the process of learning how to make the map. Next time, we will share with you some of our map making methods.

WANTED: Non-violent, easy-to-play Adventure games. We especially want games suitable for parent and young child to play together. Why do all you Adventure game designers spend your time making increasingly more difficult games for the "elite" and "sophisticated" player? The world is full of beginners. Why not make beautiful games for them? Instead of selling 1,000 incredibly complex games to the Adventure game cult, why not sell 100,000 beautiful, non-violent games to beginners, games for "the rest of us."

We are also looking for non-violent Adventure games with several levels of play. A beginner starts with an easy game and is guaranteed moderate success, then moves up to a more difficult level, and so on. Focus on exploration and problem-solving instead of "kill monster, get treasure." Make your games realizeable realistic fantasies. As Laran Stardrake once said, "Reality expands to fill the available fantasies."

#### We Love The Letters!

Our greatest pleasure in writing this column is hearing from you, our esteemed RAINBOW readers. Your letters guide us as we evolve "School is in the Heart of a Child."

Thanks, Carl H. Bloss, for two letters. We have combined them as follows:

As a new subscriber and avid reader of THE RAINBOW, I feel you should also readdress your column "School is in the Heart of a Child" to teachers, librarians and computer aides in the school. Little is done to help these people at the early critical years of children with computers. I know, I am a teacher, librarian and erstwhile programmer at a 5K level.

As an educator, I am fully aware that written curriculums often do not allow enough freedom for both the teacher and the student to explore — to work and play while learning. Schools approach learning from such a "stuffy" position that everything must be justifiable, accountable through criterion-referenced testing, or everything must have a planned outcome.

There are two schools of thought with LOGO, one following an experimential approach, the other using a planned teaching course of study. Most schools seem to be using the more restrictive planned teaching approach, even at the

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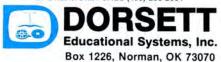
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earliest levels. This is contrary to all of Papert's concepts as well as most learning theories.

Our school will have a lab of Color Computers, but not located in the library media center where I work. Since librarians work closely with the teaching staff, we are often asked for sources with ideas and materials on a variety of computer subjects. Your column, readdressed to encompass the teacher and librarian, is a tremendous source of ideas.

Thank you very much, Carl. If I ran your school, I would give you a bunch of CoCos that kids could check out and take home overnight. People like you can blend the worlds of learning — in school and out of school — so children can have the best of both worlds. We'll send you a stuffed dragon. Put him or her in your library media center to remind you to keep plugging away and write to us now and then.

We are getting lots of letters! Thanks. Our next letter is from June Lemons.

I applaud your column and your concept about the education of children. (I strongly suspect many parents are also losing their hesitancy to try using their computers by trying your programs.)

My husband and I entered the fascinating, educational, fun world of computing a short year ago. The thrill of learning all the marvelous things our CoCo can do continues on. I contrive to spend as much time as possible reading — and keying in — articles and programs from THE RAINBOW, cheerfully rising early and retiring late in my pursuit of knowledge, participating via others' creativity.

About three months after getting our CoCo, I wrote an extremely simple program for my two-year-old grandson, a program he can use to learn: 1) letter keys; 2) how to spell his name (of course, the program is easily adaptable for any child), rewarding him with his (then) favorite music, "Happy Birthday."

I have two regrets: getting acquainted with computers so late in life, and that my grandson's parents don't share my enthusiasm. But when Bennie visits, he asks to go into what he calls my computing room where he displays a marvelous grasp of letters, colors, shapes - after all, he knows what unicorns and pedometers are!

My husband has had one disappointment — I haven't been able to "draw" a cake with icing and a flickering candle to complete "Bennie's program."

Thanks, June. We think you might like "Binary Birthday Cake" in this episode of "School is in the Heart of a Child." We'll ask Don Inman how to draw the cake with flickering candles. Of course, we will send you a stuffed dragon to play with Bennie, you and the CoCo.

Letters are close to the heart of this series. We are getting lots of letters, thank you, and want more! Our next letter is from John A. McGoldrick. John has a larger sample size than most of us — he has five children, ranging in ages from three to nine.

I have just finished reading your



	500 REM**COMPUTE W1 & W2
	51Ø FOR L=1 TO WL
100 REM**WORDSWORTH 1&2 SCH 10-1	520 : L\$ = MID\$(WRD\$, L, 1)
11Ø CLS	530 : IF L\$<"A" THEN 580
199 ?	54Ø : IF L\$>"Z" THEN 58Ø
200 REM**ASK FOR A WORD	550 : LS = ASC(L\$) - 64
21Ø PRINT	560 : W1 = W1 + LS
22Ø INPUT "YOUR WORD"; WRD\$	570 : W2 = W2*LS
299 *	58Ø NEXT L
800 REM**WL IS LENGTH OF WORD	599 ?
310 WL = LEN(WRD\$)	600 REM**PRINT BOTH WORDSWORTHS
399 *	610 PRINT "WORDSWORTH #1 IS" W1
100 REM**INITIALIZE W1 & W2	620 PRINT "WORDSWORTH #2 IS" W2
11Ø W1 = Ø	699 '
12Ø W2 = 1	700 REM**GO FOR ANOTHER WORD
199 *	71Ø GOTO 21Ø

article in THE RAINBOW and was quite impressed with it. Educational software was the overwhelming reason for the purchase of my Radio Shack 64K ECB this past January. I think your department "School is in the Heart of a Child" will help to fill the void that now exists.

I am the father of five children, ages nine, eight, six, five, and three. I cannot afford to buy software either based on advertisements or solely on the manufacturer's name — I have been burned both ways . . .

Parents want good educational software. They want software that will help their children become computer literate, but will not cause parents to become financial paupers in this quest.

Special thanks, John. I hope the CoCo "cottage industry" hears you. We, too, are tired of software that simply exploits the desire of parents to use the CoCo to help kids learn.

Yes, software is too expensive. You people out there who have kids, what do you want? What will you pay \$9.95 for? \$14.95? 19.95? and so on. What do you want?

If you have young children, compare the "holding power" of software with Sesame Street. Marido (age six), Bob, and Ramon will gladly watch Sesame Street repeats, several times — and that's free! Software should also have "holding power" and grow with the child. Home software should have vertical growth; school software is different — it is designed to be horizontal — more about this next time.

#### Wordsworth

Hooray! Several of you sent answers to our Wordsworth challenge in the August issue. Here again are the questions you answered.

1) What magic word has a Wordsworth #1 equal to the number of weeks in a year?

2) What five-letter word has the smallest Wordsworth #2?

3) What five-letter word has the largest Wordsworth #2?

4) What is the longest word (most letters) that has a Wordsworth #2 less than 20,000?

We have received answers from Amos and Josh Goldie, Lara Hansen, the Jones children, Stephen Lathom, Eric Lauterbach, and Andrea and Jenny McGinnuess. Next time we'll share their answers with you. In the meantime, send in *your* answers. Here is a Wordsworth program to compute both Wordsworth #1 and Wordsworth #2.

To answer a Wordsworth question, browse a dictionary for words to try with the above Wordsworth program. Let's all use *The American Heritage Dictionary of the English Language*, paperback edition, published by Dell Publishing Company, I Dag Hammarskjold Plaza, New York, NY 10017. You can buy it for \$3.95 at almost any bookstore or order it from the publisher.

Here are more questions for you Wordsworth fans. Remember, all these questions refer to the *American Heritage Dictionary* mentioned above.

5) In the entire dictionary, what word has the largest Wordsworth #1?

6) In the entire dictionary, what word has the largest Wordsworth #2?

7) What is the first word (alphabeti-

cally) to have a Wordsworth #1 of exactly 100?

8) In the entire dictionary, what word has a Wordsworth #2 closest to 1,000,000?

Send us your answers. We will put all answers received by December 31, 1984 in a box, shake 'em up, and draw a winner. The winner will receive, of course, a stuffed dragon.



DragonSmoke

Koala Pad is alive and well at Radio Shack! Look for it on Page 164 of the 1985 Radio Shack Catalog No. 380 or Page 52 of the 1985 TRS-80 Catalog No. RSC-12. They call it the TRS-80 Touch Pad, Catalog No. 26-1185, price \$59.95. OK, cottage industry — let's get busy and write software for this marvelous addition to the CoCo family.

We have decided to publish a little newsletter called *DragonSmoke* about four times a year. If you want a free copy, send a self-addressed, stamped envelope to *DragonSmoke*, P.O. Box 310, Menlo Park, CA 94026.

## Helping Youngsters Form Categories

#### By Steve Blyn Rainbow Contributing Editor

The young child deals with new items and experiences as unique events. He has a small fund of knowledge to draw from. He has yet to learn to classify things into groups of similar things. Children often seem fascinated by what appears to us to be something quite commonplace; they cannot place the item into a familiar category.

As we grow in experience, we begin to define items into narrower categories. The Color Computer can be an example—a beginner might at first think of the CoCo as merely a type of computer. The more experienced user knows it is in the 6800 family of computers rather than the 6500 or Z80 families. These distinctions become more important as your knowledge and needs increase.

Software is another example. Upon purchasing a computer, most people usually want to accumulate almost any kind of software. There is a need to see what the new machine can actually do. After a while, we break the software down into categories or specific areas such as business, education, leisure, etc.

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

We begin to specialize. Many of us then further specialize within an area to several favorite specific companies. Some of us even go further into specific requirements within the programs of specific companies such as OS-9 programs only or networkable programs only.

This type of refinement of categories is part of the human experience. We constantly redefine as our knowledge

"Too often, school curricula require some of the children to deal with abstract concepts before they have secured sufficient experience on earlier levels of experiences in that subject. This can lead to inadequate and insecure learning."

grows in any field. This helps us to deal with our world. There are too many items and events to deal with individually. As we grow, we learn to place them in various categories to help us effectively deal with the world around us.

Learning proceeds from concrete to abstract concepts. First we can deal only with single objects and later with categories. This process proceeds according to age and experiences at individual levels. Too often, school curricula require some of the children to deal with abstract concepts before they have secured sufficient experience on earlier levels of experiences in that subject. This can lead to inadequate and insecure learning.

The famous child psychologist, Jean Piaget, once performed an experiment to help study the levels of categorization in children. Three girls, aged seven, nine and 11 were asked to pack clothing in two suitcases. The way they would decide to arrange their clothing into the suitcases could reveal much about their thought processes.

The seven-year-old first filled one suitcase randomly with clothes until it was full and then packed the other with the remaining clothing. No real thought was given to any categories of clothing.

The nine-year-old thought for a while, and then packed all clothing worn above the waist in one suitcase and clothing worn below the waist in the other. The top part of her pajamas and a two-piece bathing suit were placed in one suitcase and the bottoms in the other.

The 11-year-old was more adult-like in her thinking and packed clothes worn during the day in one suitcase and night clothes in the other. It can easily be seen from this experiment different levels of organization of the same items.

This month's program naturally deals with grouping and categorization. The key element in this program is the DATA. We had to select one area and chose sports terminology. This was purely subjective on our part: one subject had to be chosen. Please do not restrict your program to our chosen

The DATA that you choose to enter should be age appropriate for your child. Younger children might, for example, group food items by fruit, vegetable or dairy. Older students might group chemical compounds by acid, base or salt. The DATA that you enter could also be the child's choice. This would further involve the student in the computer.

The goal for the user of this program

is to arrange the 12 words properly underneath the three category words. The words are moved one at a time by the arrow keys. After the twelfth word is moved, a list of the 12 words in their correct categories appears. The child can compare this list to the one that he has just completed.

Lines 40-50 set the dimensions and read the DATA. Line 70 prints the data words. These are the A\$ words: The B\$ letters will never be printed on the screen. Line 80 prints the category headings. (Your headings may vary from ours). Line 140 prints one of the words and lines 120-130 set the limits of the word so that it does not mess up the screen.

Lines 180-250 let you move the word around the screen. The arrow keys are represented by the character string (CHR\$) numbers 8, 9, 10 and 94. When one of the arrows is pressed, the key word to be classified is moved. CHR\$(13) represents the ENTER key. When it is pressed, the next word appears. Lines 300-360 read and print out the correct list for comparison purposes.

The DATA on Line 410 consists of 12 pairs of information. A word to be classified and an abbreviation for the classification make up one pair. They are the A\$ and B\$ portions. The abbreviations do not get used until needed on lines 320-340. Here, the computer interprets the B\$ part and places the word in the correct category.

The DATA supplied is merely one of literally thousands of possible choices. Use your imagination to help your children better classify things or events in their schoolwork and daily

190 .....190 END .....218

1Ø REM"CATEGORIES"

20 REM"STEVE BLYN, COMPUTER ISLAN D, 1984

3Ø CLSØ

The listing:

4Ø DIMA\$(12),B\$(12)

5Ø FORT=1T012:READA\$(T),B\$(T)::N EXT

**60 PRINT"** here is the word 1 ist"

7Ø FORT=1T012:PRINTA\$(T),:NEXTT 8Ø PRINT" basebal1 tennis ockey"

9Ø B\$=STRING\$(8,128)

100 N=451:Y=1

11Ø REM"SET LIMITS OF WORD PLACE MENT"

12Ø IF N<259 THEN N=259

13Ø IF N>476 THEN N=476

140 PRINT@N, A\$ (Y);

15Ø J=258:FORT=1TO4:PRINT@J,CHR\$

(249);:J=J+32:NEXTT

160 K=268:FORT=1TO4:PRINT@K,CHR\$

(249);:K=K+32:NEXT T

170 L=277:FORT=1 TO 4:PRINT@L,CH

R\$(249);:L=L+32:NEXT T

180 REM"USE THE ARROW KEYS TO MO

VE THE WORDS"

190 As=INKEYs

200 IF A\$=CHR\$(8) THEN PRINT@N,B

\$;:N=N-1:GOTO120

210 IF A\$=CHR\$(9) THEN PRINTON, B \$;:N=N+1:GOTO12Ø

220 IF As=CHR\$(94)THEN PRINT@N,B

\$;:N=N-32:GOTO120

23Ø IF A\$=CHR\$(1Ø) THEN PRINT@N,

B\$;:N=N+32:GOTO120

24Ø IF A\$=CHR\$(13) THEN Y=Y+1:N= 451:SOUND150,2:IF Y>12 THEN 270

ELSE 12Ø

25Ø GOTO 19Ø

260 REM"GET & PRINT THE CORRECT LISTS"

270 PRINT@384,STRING\$(32,239);:F ORT=1T09: PRINTSTRING\$ (32, 128); :N

EXTT 280 PRINT@194, "here are the corr ect answers";

29Ø D=227:E=237:F=246

300 RESTORE: FOR G=1TQ12: READA\$(G ) , B\$ (G)

31Ø FORG=1T012

320 IF B\$(G)="B" THEN PRINT@D, A\$

(G);:D=D+64

330 IF B\$(G)="T" THEN PRINT@E,A\$

(G); :E=E+64

340 IF B\$(G)="H" THEN PRINT@F, A\$

(G);:F=F+64

35Ø SOUND23Ø,1

360 NEXT G

370 PRINT@486, "PRESS ENTER TO GO

ON";

38Ø EN\$=INKEY\$

39Ø IF ENS=CHR\$(13) THEN RUN

400 GOTO 380

410 DATA LOVE, T, ICING, H, FACEOFF, H, TRIPLE, B, DUECE, T, GOALIE, H, MOUN D,B,RACKET,T,PUCK,H,PLATE,B,BALK

,B,FAULT,T





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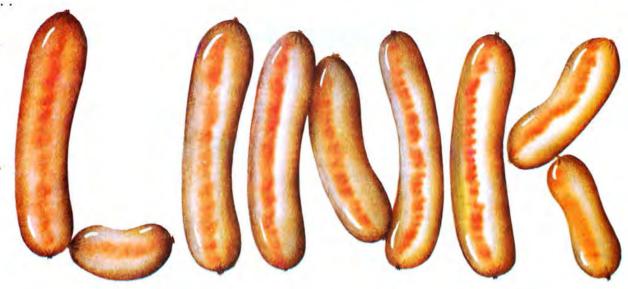
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Here's a program that concatenates RAM records and writes them on tape. It's your missing . . .



By H. Allen Curtis

an you do the following with a single cassette load command?

1) Load the text screen to display an introductory message or low resolution picture;

2) Load a BASIC program;

3) Load the graphics screen with a high resolution picture for subsequent display;

4) Load automatically memory protected high RAM with assembly language routines to be called by *USR* functions;

5) Automatically start the BASIC program; and

6) Provide some piracy protection for your program.

If you cannot, then you are missing Link. No, I did not mean that you are the missing link, but that you are missing out by not using the Link program to be presented in this article.

(H. Allen Curtis resides in Williamsburg, Va. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.)

Link is not a pre-loader. That is, Link does not have to be loaded into RAM before you issue the command to load your program, screens and subroutines. Link concatenates (links) as many as 10 non-contiguous RAM records and writes them on tape. A record is defined here as any program (BASIC or assembly language), any contiguous assembly language routines, or any set of stored data. The linked records written on tape are simply loaded by means of BASIC's CLOADM command.

If you want to employ *Link* to record and auto-start an assembly language program instead of a BASIC program, you can readily do so. In fact, *Link* is an assembly language program which will be used to record itself.

Link has the ability to write a record from one RAM location and load it into another specified RAM location without recourse to the offset feature of the CLOADM command. Thus, for instance, you may design several text screens, transfer them to new locations in RAM and then use Link to write them on tape for future sequential loading and display on the text screen. The fact that you relocate one or more records such as screens does not require you to relocate the other records to be linked and written.

The order in which records are concatenated is left to your discretion. If you, for example, have more than one text screen to be loaded and displayed, you would probably load one or two records between screen records to allow the screen to be displayed for a sufficiently long time.

Link can be employed as part of a protection process for your programs. How Link can be used in this way will be discussed in detail at the close of the article.

The program of Listing 1 generates Link and stores it in RAM. The strings in lines 20 through 120 of Listing 1 are messages used by Link to prompt you in the process of concatenating records and writing them on tape. The values in the DATA statements of lines 210 through 520 comprise Link routines that actually do the linking and writing of the records on tape. The values in the remaining DATA statements form the major portion of the first record to be written on every Link produced tape. You do not specify this record. The record is Link's means of altering the usual CLOADM sequence of instructions to permit the proper loading of concatenated records.

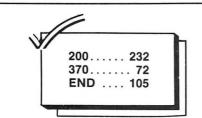
Incorporated into Listing 1 is a check on the accuracy of your typing of the

DATA statements. Thus, with the use of Rainbow Check Plus you are doubly aided in the correct typing of Listing 1. When you have correctly typed Listing I and run the program without the

occurrence of any error messages, save it on tape: Type CSAVE"GENLINK" and press ENTER.

After saving the program of Listing 1, run it again. Then type EXEC and press

ENTER. This action will produce the first prompt of Link. Link requires you to provide a filename for the concatenated records to be put on tape. Usually the filename will be that of the main pro-



Listing 1:

10 'ENTRY ADDRESS IS &H1100; FIR ST ADDRESS IS &H1000; LAST ADDRE

SS IS &H132B

2Ø A\$="TYPE & ENTER

3Ø B\$="FILENAME:

4Ø C\$="TYPE (IN HEX)

5Ø D="ENTRY ADDRESS:

60 Es="POSITION TAPE

7Ø F\$="FIRST SOURCE

8Ø G\$="LAST

9Ø H\$="FIRST DESTINATION

100 Is="ALL RECORDS SPECIFIED? (Y/N)

11Ø J\$="READY CASSETTE TO RECORD

120 K\$="THEN PRESS ENTER

13Ø X=256\*PEEK(VARPTR(A\$)+2)+PEE K(VARPTR(A\$)+3)

14Ø FORI=ØTO 174

150 POKEI+&H1000, PEEK(I+X)

16Ø IFPEEK(I+X)=Ø THENX=X+8

170 NEXT: IFPEEK (398) = 57THENPOKE3 99,174:POKE4ØØ,64:POKE398,126 18Ø FORI=ØT0596:READL\$:L=VAL("&H "+L\$): E=E+L: POKEI+&H1ØAF, L: NEXT 190 FORI=0T076: READL \$: L=VAL("&H" +L\$):E=E+L:POKEI+&H1E2,L:NEXT 200 IFE<>78082 THENCLS:PRINT"DAT

A ERROR"ELSEPOKE&H9D, 17: POKE&H9E ,ø

21Ø DATA 5F,3Ø,1,A6,84,26,FA,8D, 1F,84,F,97,7D,8D,12,9A,7D,97,7D 22Ø DATA 8D,13,84,F,97,7C,8D,6,9 A,7C,97,7C,5D,39,8D,5,48,48,48 23Ø DATA 48,39,8C,2,DD,27,15,A6, 82,81,30,25,11,81,3A,25,C,81,46 24Ø DATA 22,9,81,41,25,5,88,9,81 ,4F,39,C6,8,D7,8C,7E,A9,51,7E,A9 25Ø DATA 28,7E,B9,9C,8D,F8,8D,26 ,31,8D,FF,21,3Ø,A8,D6,8D,FØ,8D 26Ø DATA 1E,8D,12,C6,8,3Ø,1,CE,1 ,DA,A6,8Ø,27,36,A7,CØ,5A,26,F7 27Ø DATA 2Ø,36,8D,D8,C,89,7E,A3, 90,86,A3,8C,86,C3,97,89,39,8D,C6

28Ø DATA 3Ø,A8,ED,8D,F1,8D,C2,3Ø

,85,C,89,39,86,20,A7,C0,5A,26,FB

,88,DF,8D,BD,2Ø,EB,8D,B9,1F,21 29Ø DATA 2Ø, DB, 8D, E8, 96, 44, BD, A2

300 DATA 8D, D7, 30,88,18,8D,C3,A6 ,1,81,58,26,5,8E,2,20,20,7,17,FF 31Ø DATA 41,26,E9,9E,7C,BF,1,E5, BF, 2, 1E, CE, 2, 2F, DF, 45, C6, 31, D7 32Ø DATA 44,33,8D,1,7F,DF,42,8D, BF, 3Ø, A8, 18, 8D, B4, A6, 1, 81, 58, 26 33Ø DATA 39,DE,42,CC,Ø,19,ED,C4, 9E, 45, ED, 84, C6, 20, ED, 42, DC, 19, ED 340 DATA 44,ED,2,DC,1B,ED,46,8D, A,8D,8,C,44,8D,11,25,72,20,5E,DE 35Ø DATA 42,33,44,DF,42,DE,45,33 ,42,DF,45,39,C,44,86,39,91,44,39 360 DATA 17, FE, DF, 26, B5, DE, 42, DC ,7C,ED,C4,17,FF,6D,3Ø,A8,25,8D 370 DATA 79,30,13,17,FF,5D,17,FE ,C7,26,EE,DE,42,DC,7C,ED,42,17 38Ø DATA FF,55,3Ø,A8,2A,8D,61,1F ,21,8D,5D,86,E3,97,89,BD,A3,9Ø 39Ø DATA 17,FE,A9,26,E8,DE,45,DC ,7C,ED,C4,8D,B6,25,13,8D,A5,BD 400 DATA A9,28,30,A8,3C,8D,3D,BD ,A1,B1,81,59,1Ø,26,FF,62,9E,45 41Ø DATA 6F,84,6F,1,FE,1,8F,FF,1 ,FF,CE,1,E9,FF,1,8F,DC,74,7F,2 42Ø DATA 45, DE, 42, 83, Ø, E8, DD, 7C, 30,1E,8C,2,2D,27,2E,33,5C,EC,42 43Ø DATA A3,C4,E3,84,10,93,70,22 ,17,20,EA,7E,B9,9C,8D,FB,17,FE 440 DATA CC, 30, A8, 74, 8D, F3, BD, A1 ,B1,81,D,26,F9,39,AE,84,30,1F,BF 450 DATA 2,46,7A,2,45,A,44,BD,A9 , 28, 17, FE, AA, BD, A7, CA, 3Ø, 2A, 8D 460 DATA D5,BD,A7,E9,BD,A9,28,17 ,FE,9A,3Ø,A8,5B,8D,C7,3Ø,8C,6C 470 DATA 9F,42,8E,0,F,9F,7C,8E,1 ,DA,9F,7E,BD,A7,E5,BD,A7,D8,8E,1 48Ø DATA 8E,9F,7E,8E,1,BA,9F,7C, 8D, 2F, D6, 44, CØ, 3Ø, D7, 44, 8E, Ø, 1 490 DATA 9F,7C,8D,22,9E,42,AE,84 ,9F,7E,CE,1,FF,DF,7C,DE,42,EC,42 500 DATA C3,0,1,93,7E,27,F,10,83 ,Ø,FF,24,2,D7,7D,8D,2,2Ø,E2,7E 510 DATA A7,F4,0,7C,F,7D,8D,F7,9 E, 42, 30, 4, 9F, 42, A, 44, 26, CD, BD, A7 520 DATA E9, BE, 1, FF, BF, 1, 8F, 16, F 530 DATA 2,0,0,0,0,1,8E,35,10,86 , 2, 45, 27, E, FC, 2, 46, DD, 27, DD, 23 540 DATA 83,0,C8,DD,21,1F,4,8E,0 ,Ø,BF,1,8F,CE,2,2F,AE,C4,9F,7E

55Ø DATA BD, A7, F, 26, 1C, D, 7C, 2A, F

560 DATA 0,0,BD,AD,21,9E,A6,30,4

5,33,42,AE,C4,26,EF,BD,A7,E9,7E

,9F,A6,7E,AD,CØ,7E,A6,19

gram whether in BASIC or assembly language. Rather than having a BASIC program that generates Link, it is more convenient to have Link recorded on tape directly as an assembly language program. Therefore, type the filename Link and ENTER it. This will initiate the process of using Link to record itself on tape.

The second prompt requests the entry address of the main program, which in this case is *Link*. All the required *Link* addresses have been provided in the REM statement of Line 10 of Listing 1. In accordance with that REM, type 1100 and press ENTER. You do not need to type &H in answering the prompt. The hexadecimal address 1100 is the address at which *Link* starts executing. If any of the characters of the ENTERed address are not a valid hexadecimal digit, a beep alarm will be sounded and the prompt will be repeated.

The next prompt asks for the first source address of the first record that you want on tape. Associated with each record are two sets of addresses — source addresses and destination addresses. The source addresses are the lowest (first) address and the highest (last) address of the record as it is presently located in RAM. The destination addresses are the corresponding RAM addresses into which you want the record to be loaded.

In the case of *Link*, only one record is involved; hence, you should type the first source address of *Link*. That is, type 1000 and press ENTER.

The third prompt is similarly answered by typing and entering the last source address 132B of *Link*.

You will probably want at least two versions of *Link*, one to be loaded in its present RAM location and one destined for high RAM. Therefore, for the former version answer the fourth prompt by typing 1000 and pressing ENTER.

Since you only need to specify one record for *Link*, answer the next prompt by pressing the 'Y' key to indicate yes.

Instead of recording Link immedi-

ately following GENLINK on your cassette tape, it would be more convenient to record Link at the beginning of the reverse side of the tape. Therefore, flip the cassette over, rewind the tape and position it. Then answer the positioning prompt by pressing ENTER.

In accordance with the next prompt, depress the Play and Record buttons of your recorder and then press ENTER. When the recording is finished, the recorder will stop and the initial prompt of *Link* will return.

Now, you can repeat the process to produce a high RAM version of Link. Therefore, type the filename HILINK and press ENTER. The requested entry address of HILINK is the destination entry address which is 3DD4 or 7DD4 depending on whether you have a 16K or 32K RAM, respectively. The first and last source addresses that you must type are the same as previously, 1000 and 132B. The first destination address is 3CD4 or 7CD4 for a 16K or 32K system, respectively. When you later load HILINK, you will not have to use the CLEAR command to memory protect it. HILINK will be automatically memory protected.

A detailed example will be presented to illustrate how to use Link. However, before that presentation, it would be well to determine whether or not you have good recordings of Link and HIL INK. Do not use SKIPF to make that determination. Use of SKIPF on any Link produced recording will always yield an I/O Error message. Link purposely forces an I/O Error to occur as a means of altering the CLOADM command routine. Link changes the "hook" that links the ROM and RAM when errors occur. The new hook causes entry to be made to the first loaded record which controls the loading of all succeeding records. The original hook is restored before loading the subsequent records. Hence, those records are checked for I/O Errors as they are loaded.

To test the recordings of *Link* and *HILINK* do the following: turn off your

computer and then turn it on again. Type CLOADM and press ENTER. Rewind the tape and position it. Finally, depress the Play button. While Link is loading, note that the letter 'F' at the top leftmost position of the screen stops blinking. The blinking of 'F' on all Link produced recordings will be suspended. The purpose of suspending the blinking of 'F' is to guarantee the unmarred loading of the text screen when you desire to precede the running of the main program with one or more screen messages or pictures. If the recording is good, no I/O Error message will occur. Furthermore, upon the completion of loading, Link or HILINK will automatically start and the initial prompt will appear on the screen. To exit from Link for the CLOADMing of HILINK press the Reset button. Before you load HI LINK, note the recorder counter setting for later reference.

If you should happen to have a bad recording of either *Link* or *HILINK*, *CLOAD* the program *GENLINK* and run it. Then type *EXEC*, press ENTER and repeat the process of recording *Link* and *HILINK* on a new tape.

The programs of listings 2 and 3 are integral parts of the example to illustrate how to use *Link*. Lines 10 through 70 of Listing 2 construct a text screen and transfer its contents to another area of RAM. Lines 80 through 100 produce a simple, high resolution graphics display. The remaining lines of Listing 2 generate a machine language routine and store it in RAM. *Link* will be employed in concatenating and recording the text screen, graphics screen, machine language routine and the BASIC program of Listing 3.

When you have typed the program of Listing 2 correctly, run it. You may wish to save it as a precautionary measure. After running the program of Listing 2, erase it via the *NEW* command. Then type Listing 3.

Line 10 of Listing 3 turns on the previously loaded graphics display. The remaining lines "paint" the display in a

```
Listing 2:

10 CLS:K=255

20 FORI=ØTO31:POKEI+J+&H4ØØ,K:NE

XT

30 K=K-16:J=J+32:IFK>142THEN2Ø

40 PRINT@238,"LINK";:PRINT@268,"

EXAMPLE";:K=K+32

50 FORI=ØTO31:POKEI+J+&H42Ø,K:NE

XT

60 K=K+16:J=J+32:IFK<256THEN5Ø

70 FORI=ØTO511:POKEI+&H2AØØ,PEEK
```

```
(I+&H4ØØ):NEXT
8Ø PMODE4:PCLS:SCREEN1,1
9Ø CIRCLE(128,96),85
1ØØ PAINT(128,96),1
11Ø FORI=ØTO23:READA$:A=VAL("&H"+A$):POKEI+&H2DØØ,A:B=B+A:NEXT
12Ø IFB<>3116THENCLS:PRINT@267,"
DATA ERROR":STOP
13Ø DATA BD,B3,ED,DD,44,9E,BA,33,89,18,Ø,DF,42,A6,84,98,45,A7,8Ø
```

Listing 3:

10 PMODE4: SCREEN1, 1

20 A=256\*PEEK(116)+&HE8: DEFUSR=A

3Ø FORJ=ØTO1

4Ø A=USR (85): GOSUB8Ø

50 A=USR(170):GOSUB80:NEXT 60 PMODE3:SCREEN1,L:IFL=0THENL=1 ELSEL=0 70 GOTO30 80 FORI=0TO300:NEXT:RETURN

variety of colors. The color changes are achieved primarily through the machine language routine called by the USR functions of lines 40 and 50. This routine is assumed by the program to have been loaded into the high RAM and automatically memory protected there. The example would be more realistic if the graphics screen had contained an intricate drawing requiring considerable program memory to produce it. In such a case the loading of the completed drawing would result in a significant savings in program memory. Frequently, the saved memory could be put to profitable use in program expansion and improvement.

Do not run the program of Listing 3 when you have finished typing it correctly. Instead refer to the previously noted recorder counter setting in positioning the tape for *CLOADMing HILINK*. *HILINK* rather than *Link* is used here because *Link* loads into the graphics screen memory area and would therefore ruin the display generated by the program of Listing 2.

The completion of the loading of *HILINK* is signalled by the appearance on the screen of the first prompt. Answer it by typing and entering the filename *EXAMPLE*. Usually the next prompt requires the typing of a hexadecimal address. There is one exception. That occurs when the main program is in BASIC, which is the present situation. In such a case, just press the 'X' key and then ENTER.

The text screen was stored by the program of Listing 2 in the RAM area from 2A00 through 2BFF. Hence, answer the next prompt by typing and entering 2A00. Similarly, type and ENTER 2BFF in response to the last source address prompt. Because you will want the text screen to reside in the usual location, answer the destination address prompt by typing 400 and pressing ENTER.

In order to specify the second record, press the 'N' key in response to the next prompt. The second record is the graphics screen. If you have a cassette-based system, the screen resides at addresses 600 through 1DFF. However, if you have the Disk BASIC ROM connected, the graphics screen is located at addresses E00 through 25FF. Thus, your response to the first source address

prompt should be the typing and entering of 600 or E00 depending on your system. Likewise, for the last source address prompt, type either IDFF or 25FF and ENTER. In response to the destination address prompt type and ENTER 600 or E00 for cassette or disk-based systems, respectively.

"... Link can be used as part of a scheme to protect your programs against piracy. There is a simple, yet fairly effective scheme for piracy protecting assembly or machine language programs."

Press 'N' to permit the specification of the third record. This record is the BASIC program of Listing 3. Typing and entering X will automatically take care of all address specification for you. Actually, an additional record will also be automatically specified. The additional record is only eight bytes long and consists of the vital BASIC program pointers at hexadecimal addresses 19 through 20 (corresponding to decimal addresses 25 through 32).

There is one more record to specify, so once again press 'N' in response to the record's specified prompt. Even though the previous record was numbered three, the present record has been given the number five. The number four record was the eight-byte record automatically specified along with the BASIC program. Record five is the machine language routine generated by the program of Listing 2. It was stored at RAM addresses 2D00 through 2D17. However, it is to be loaded into high RAM at addresses 3FE8 through 3FFF or at 7FE8 through 7FFF depending on whether you have a 16K or 32K RAM, respectively. Therefore, each of the next three prompts should be answered by

typing and entering, in order, one of the addresses: 2D00, 2D17 and 3FE8 or 7FE8.

Complete the process by pressing 'Y' and appropriately carrying out the instructions of the final two prompts. In positioning the tape make a note of the counter setting of the recorder for later loading of *EXAMPLE*. The signal that recording is finished is the return of the initial prompt to the screen. You will have a rather long wait for the prompt because of the 6K length of the graphics screen record.

In general, you may specify a maximum of nine records. If one of the specified records is a BASIC program, the most that you may specify is eight records unless the BASIC record is the ninth one specified.

Back to the example, load *EXAM PLE* by means of the *CLOADM* command. You should be quickly greeted with the text screen generated by the program of Listing 2. This screen will remain on display for the time needed to load the other records including the rather lengthy graphics screen. When loading is complete, the BASIC program will automatically start and the graphics screen will replace the text screen. The *USR* called machine language routine will keep changing the colors in the display. To end the program press the BREAK key.

For those with disk systems it is worthwhile interjecting a short note of caution. If you record a tape using Link with the disk ROM connected, always load the tape with a connected disk ROM. Likewise, if the tape is recorded with the disk ROM disconnected, always load it with the disk ROM disconnected; otherwise, problems would be likely to occur in the execution of the associated programs.

As was previously mentioned, *Link* can be used as part of a scheme to protect your programs against piracy. There is a simple, yet fairly effective scheme for piracy protecting assembly or machine language programs. The scheme will be illustrated by adding protection to *Link* itself.

With the present unprotected version of *Link*, the Reset button can be pressed to return to the CoCo's command mode in which an *EXEC* command can be employed to gain entry to a preloaded



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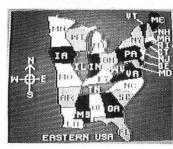
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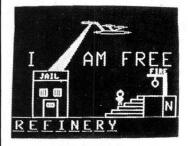
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\$14.95 - Tape Disk compatible program to analyze *Link*. In the proposed protected version of *Link* every BASIC command will be disabled and will result in an immediate error message when issued.

To add this protection to Link, turn your computer off and on again and load Link. Then give this version of Link the filename PROLINK. As you did previously, type and ENTER 1100 for the Link entry address. However, before specifying the Link program record, you must specify the protection record. It consists of six consecutive zero bytes. Locations 250 through 255 contain such bytes. Therefore, the first and last source addresses are 250 and 255, respectively, in the first record specification. For the first destination address, type 120 and ENTER it. Addresses 120 and 125 are usually stored the number of statements and functions, respectively, in the Color BASIC repertoire of commands. Making those quantities zero tricks the BASIC interpreter into "thinking" that it has an empty vocabulary.

Type 'N' to allow the specification of the *Link* program record. Carry out the remainder of the procedure exactly as you did in the production of the unprotected *Link*.

Some of you who are well versed in assembly language programming and are familiar with the CoCo's memory map may already see a way around this protection scheme. One of the hooks that link the ROM and RAM could be

when you are further protecting a program, 15E, 18D and 15E should be the first source, last source and destination addresses of the second specified record.

BASIC programs cannot be protected in the same manner as assembly or machine language programs. A BASIC program clearly could not run if its commands were disabled. The scheme

BASIC programs cannot be protected in the same manner as assembly or machine language programs. A BASIC program clearly could not run if its commands were disabled. The scheme for protecting any BASIC program does not disable the BASIC commands during program execution but does so when the program has been stopped by any means.

As in the more effective scheme for piracy protecting assembly language programs, the hooks at addresses 15E through 18D must comprise one protection record. However, one hook address in the record must be changed to point to a short machine language subroutine which forms a second protection record. The subroutine is what controls whether or not BASIC commands are disabled.

The objective of the program of Listing 4 is to generate the two protection records and store them in a convenient place in RAM. For purposes of illustrating the scheme, the area chosen to store the two records we located at addresses 3000 through 303C. The first address 3000 was assigned in Line 10.

appropriately alters the hook record to provide entry to the short subroutine.

When you have correctly typed the program of Listing 4, save it for future use in protecting BASIC programs.

The protection scheme will be illustrated by applying it to the short example program of Listing 5. Therefore, after running the program of Listing 4, erase it by means of the *NEW* command. Then type Listing 5.

After typing the latter program, *CLOADM Link*. The responses to the *Link* prompts should be consecutively as follows:

PROBASIC X 3000 302F 15E N 3030 303C 3030 N X

Y

Then appropriately follow the tape positioning and recording prompts. In the positioning process note the recorder counter setting for *PROBASIC*.

To test the protection scheme turn your computer off and then on again. Then load *PROBASIC* using *CLOADM*. When *PROBASIC* is loaded, it should request the typing of your

#### +11,&H3Ø+A-256\*C Listing 4: 100 DATA 34,2,96,A6,81,6,25,FE,3 10 CLS: A=&H3000 5, 2, 7E 20 FORI=0TO47:POKEI+A, PEEK(I+&H1 Listing 5: SE): NEXT 10 CLS: PRINT@226, "TYPE YOUR NAME 3Ø FORI=ØT01Ø:READD\$:D=VAL("&H"+ & PRESS ENTER":PRINT@260,""; D\$):B=B+D:POKEI+A+48,D:NEXT 4Ø IFB<>977THENPRINT"DATA ERROR" 20 LINEINPUTAS 30 PRINT@358, "PRESS ENTER TO STO :STOP 50 FORI=0T01:POKEI+A+59, PEEK(I+& H168): NEXT 40 K#=INKEY#: IFK#<>CHR#(13) THEN4 60 C=INT(A/256):POKEA+10,C:POKEA **ØELSESTOP**

the means of gaining entry to a preloaded program for analyzing Link. The occurrence of an error could be made to cause such an entry. Therefore, to make protection more effective you should specify a second protection record before the Link program record. This second record consists of the hooks located at RAM addresses 15E through 18D. There are other hooks but they have already been accounted for in the loader record which is always written on tape without your specifying it. Hence,

When you protect your own BASIC programs, you should (by appropriately editing Line 10) make the assignment consistent with the memory available to accommodate 61 consecutive RAM locations. Line 20 stores at addresses 3000 through 302F an image of the hooks at 15E through 18D. Lines 30 through 50 along with Line 100 are concerned with generating and storing the short subroutine. The subroutine is stored at addresses 3030 through 303C immediately following the hook record. Line 60

name. The program will then go into a loop. You can stop it by pressing ENTER, BREAK or Reset. Regardless of how you stop *PROBASIC*, typing and entering any BASIC command of your choice will cause the computer to hang up.

Link and the protection schemes were developed for your personal use. If you should wish to employ them commercially, please get in touch with me via THE RAINBOW to discuss mutually agreeable royalty terms.





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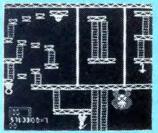
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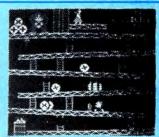


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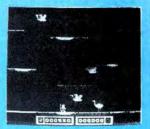
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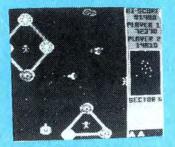
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#### DRACONIAN

You brace yourself as your ship materializes in the enemy sector. Your engine roars to life, and you consult the long-range scanner for the position of the nearest enemy base. As you head for the base, blasting asteroids and space-mines in your path, you suddenly notice a monstrous space-dragon looming before you. Reacting quickly, you dodge his deadly fire-breath and blast him out of existence.

Finally, the enemy base comes into view. Avoiding the enemy fire, you destroy the gun turrets one by one with your rapid-fire torpedoes. Then, with the explosions still echoing around you, you rescue the astronaut who was being held

prisoner by the enemy. Your mission is far from over, however, as there are more bases to destroy and more astronauts to rescue before the sector will be secured. And all must be done quickly; if you are too slow, the invincible DRACONIAN will surely seek you out as its next victim.

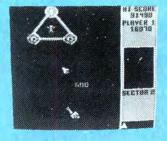
This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

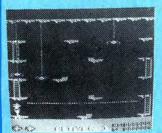
JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

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#### CRASH

This game is a high resolution Machine Language program with outstanding Arcade type graphics. The game consists of 4 screens. Fly the airplane over and through obstacles. Piloted by "Mario" who also appeard in "The King". The object is to conquer one screen after another but don't "Crash". Great fun for the whole family. For 1 or 2 players. Uses joysticks.

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#### **CHAMBERS**

Exciting high resolution graphics game. Multiple screens. Outstanding sound, Chambers is loosely based on Cosmic Chasm. The object in each level is to destroy all of the evil creatures in each room and then go into the main reactor room and blow up the base.

JOYSTICKS REQUIRED
32K MACHINE LANGUAGE
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#### WAREHOUSE MUTANTS

Journey through the warehouse seeking out the Mutants who are out to destroy you. WATCH OUT! They will push crates trying to crush you! Outstanding realism—high resolution graphics—multiple screens.

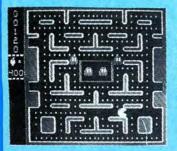
JOYSTICKS REQUIRED 16K MACH. LANGUAGE TAPE \$24.95 DISK \$27.95

#### QUIX

This one is after a popular arcade game with a similar name. Simply frustrating—you'll love it. Done in high resolution graphics with Super Sound.

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#### MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade Pac games that I have seen for the Coco.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE TAPE \$24.95 DISK \$27.95

#### PAK-PANIC

Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will link together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed. JOYSTICKS REQUIRED

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The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- -As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
- -Words and definitions may be saved on disk or tape.
- -Remarks and/or comments can be saved with word files.
- -A disk loading menu allows students to load disk files without typing file names.
- -Word lists may be quickly alphabetized.
- -The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.

**TAPE \$39.95 DISK \$42.95** 

- -The printer segments allow full use of your printer's special features.
- -The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

#### FRACTIONS - A Three Program Package - 32 K EXT. BASIC TAPE \$30.95 DISK \$35.95

#### LOWEST TERMS

- MIXED & IMPROPER

- Review converting mixed numerals and improper fractions.
  Practice converting mixed numerals to improper fractions.
  Practice converting improper fractions to mixed numerals.
  Practice of both types. (Mixed to improper & improper to mixed).
  Review converting mixed numerals to mixed numerals.
  (Used in regrouping in substraction)
  Practice converting mixed numerals to mixed numerals.

- **EQUIVALENCE**

- Definitions of terms and review of finding equivalent fractions.
   Practice finding equivalent fractions.
   Practice finding sets of equivalent fractions.
   Review of finding if one fraction is equal to, not equal to, less than or greater than another.
- Practice finding if one fraction is equal to, not equal to, less than or greater than another.
- Review of placing fractions into lowest terms by finding the greatest common factor (GCF) of the numerator and denominator.
   Practice finding the GCF of pairs of numbers.
   Practice placing fractions into lowest terms by finding the GCF of the numerator and denominator.

#### TEACHER'S DATABASE

TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There

- are many features that make this program particularly attractive:
   Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record. The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.

  Records may be easily changed, deleted, combined or added.

  Information about students may be numerical or text.

- Records may be quickly alphabetized. Records may be sorted by various criteria. Records may be reordered (ranked) based on test scores or other
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
   Student test scores may be weighted.
   REQURES 32K EXT. BASIC
   TAPE \$39.95 DISK \$42.95

#### **MATH DUEL**

MATH DUEL is a challenging mathematics game that pits you against the computer it a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you to gather more numbers and thus more points that than the computer.

The game is deceptively simple. You select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the prayimm number of points and the computer the least

that will give you the maximum number of points and the computer the least number of points. There are only 6 rules

- Any number that you chose must have at least one factor still on the playing field.
- You receive points equal to the face value of the number that you chose.
- The computer receives points equal to the face value of all of the remaining factors of the number that you chose.
- All of the numbers that were awarded to you or to the computer are removed from the field.
- The game continues until there are no numbers with factors remaining.
- 6. At the end the computer receives points equal to the value of all of the remaining numbers. 32K EXT. BASIC

**TAPE \$24.95 DISK \$29.95** 

#### ESTIMATE

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer, it has many features that make its use particularly attractive.

- . Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- · The acceptable percent error may be changed as a student's skill improves
- · A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- · If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- · If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- · A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- . The (BREAK) key has been disabled so that child will not inadvertently stop the program from running. REQUIRES 16K EXT. BASIC

**TAPE \$19.95 DISK \$22.95** 

#### PRE-ALGEBRA I INTEGERS

INTEGERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills.

- . Up to 4 students may use the program at the same time.
- · There are 9, user modifiable, skill levels.
- · Students are given two opportunities to answer
- · A detailed report of student performance, including number correct on first try, number wrong, total time used and percentage score, is presented at the end of a series of problems.
- . The programs will run on a 16K TRS-80 Color Computer with or without disk drive.

Four distinct problem formats are presented. The first presents problems in this format: -12 + -9 = ? The second program presents a problem with missing numerals in this format: -7 - ? = 18. The third program presents a problem with a missing sign: 8 - ?6 = 14. The last program asks the student to determine the relationship  $(=, \blacktriangleleft \text{ or } \blacktriangleright)$  between two statements 3 - 9 (??) - 4 - 5.

32K EXT. BASIC **TAPE \$28.95 DISK \$33.95** 

#### PRE-ALGEBRA II

The second PRE-ALGEBRA PACK is composed of two programs, EQUATION SOLVER AND EQUATION DUEL, that are designed to give students practice in using and solving equations. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- . In both programs students may choose the range of numerical values that will be included in the equations so that the difficulty may change as their skill increases.
- In EQUATION SOLVER the computer secretely generates a random equation, shows the numbers that it used in the equation and the answer and challenges the student to create his/her own equation that uses the same numbers and results in the same answer
- . In EQUATION DUEL the student and the computer race to see who will be the first to create an equation from the same set of random numbers.
- · Both programs give detailed reports of the student's and the computer's performance in creating and solving equations including time used, score and percentage correct.

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## An Introduction To The Inside Of The CoCo 2

Editor's Note: A correction to the wiring instructions and the BASIC listing for last month's column appear on Page 226 of this issue.

By Tony DiStefano Rainbow Contributing Editor

y, doesn't time go fast? I can't believe I've been writing for RAINBOW for two years now.

January being THE RAINBOW'S Beginners issue, I decided to introduce the novice to the inside world of the Color Computer. The latest CoCo 2 is the newest Color Computer to be introduced by Tandy. It is different inside from the old CoCo 2. You can tell the difference by the shield covering the power transformer. Though it functions the same, the insides of this CoCo are very different (again!). More on that later.

Before we get on our way, let me mention that I just came back from my second RAINBOWfest. I must say that these shows are great. I found THE RAINBOW staff to be very friendly and helpful. It is amazing to see that much enthusiasm generated about the Color Computer. Chances are I'll see some of you at the next RAINBOWfest, too, in California. Stop in and say hello. Look for me at the R.G.S. Micro booth.

Now, let's look into this little thing, but remember, opening your computer might void your warranty. Radio Shack only warranties the computer for three months, so after that you are on your own, anyway. First of all, never open the computer with the power on. Now that that's said, let us continue.

To open your CoCo, use the following

procedure. Place the computer upside down on a towel (or other soft surface) on a clean work table. Remove the four screws (one in each corner) with a medium-sized Phillips screwdriver. There is one more screw to remove; it is behind the little sticker that says "Opening case will void warranty. See owner's manual for warranty informa-

(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)



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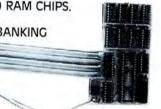
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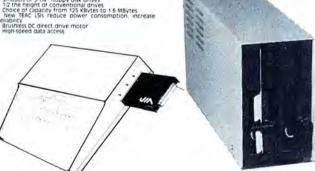


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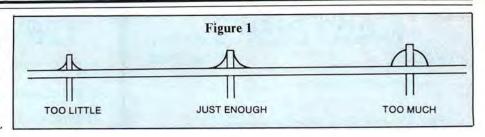
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tion." You must break this seal to remove the last screw. That is how Radio Shack can tell if you have opened it. Just push the screwdriver through the center of the sticker; it will give way to a hole. Some of the CoCo 2s may have a sixth screw on the other side. Remove the last screw. Turn the



	TAB	BLE 1	
IC#	Name	Description	
1	SC77527	SALT Power supply	
2	MC6821P	and RS-232 CHIP PIA Peripheral interface adapter	
3	SC77526	DAC Digital to analog converter	
4	NE555D	Timer for color burst in PMODE 4	
5	74LS273	Octal D-Type Flip-flop	
6	74LS244	Octal Buffer Driver	
7	SC67331P	IIA Industrial interface adapter	
8	MC6847P	VDG Video Display Generator	
9	MC6809EP	CPU Central Processing Unit.	
10	74LS02	Quad 2-input Nor Gate	
11	74LS138	3 to 8 Decoder Chip	
12	8040364B	ROM BASIC 1.2	
13	8042364A	ROM EX BASIC 1.1	
14-21	8040517	16K DRAM Dynamic Random Access Memory	
22	MC6883P	SAM Synchronous Address Multiplexer	
	Beginners Proj	ect Parts List	
Quanti	ity Description	Radio Shack	
1	LED	276-068 or 276-069 or	
1	RESISTOR	276-073 R 1k ohms 271-8023	

computer back right side up, and gather up the screws that drop out. Grab the top cover of the computer and pull it off. Wow! Look at all those things. The components marked with the letter 'U' (or 'IC' in the case of the newest CoCo) are known as ICs (Integrated Circuits). Table 1 labels all the ICs used in the computer and gives a short description of each

Some of the components that make up the CoCo are very sensitive to static electricity. You must be careful not to zap (permanent damage caused by static discharge) a chip by touching the pins with your fingers. If you must touch a chip, always touch a ground point with your fingers first. This will discharge any static your body might be carrying to ground. A good ground point to touch is the RF adapter. That is the big metal can sitting to the left, where you plug in the TV wire. Another point is one of the metal clips that hold the bottom shield to the main PCB (Printed Circuit Board). You will find these clips all around the edge of the PCB.

Now that we have seen the insides of the CoCo and are a bit more familar with its parts, let's do something to it. About the simplest thing we can do is add a pilot light. It is not hard, and if you take it one step at a time, anyone will be able to do it, and the good thing about it is that it costs less than \$1. By the way, this pilot light will work on any version, not just the CoCo 2. Before you plunge into this though, if you do not have any soldering expe-

rience, practice on something else first. To do this, you will need a soldering iron. A low power, medium or fine tip soldering iron will do. The solder to use must be a rosin core and not too thick. Radio Shack sells both at a reasonable price. If you have never handled a soldering iron before, get Radio Shack's proto-board and practice on it first

Here are the step-by-step instructions on how to solder:

- Make sure that your soldering tip is clean and hot. A wet sponge is great to clean the tip.
- 2) Secure the component to the PCB.
- 3) Heat the component and the PCB with the iron.
- 4) Touch the end of the solder to the component. My personal habit is to position the solder so that it will touch the iron, component and PCB at the same time.
- 5) When enough solder flows, remove the solder.
- 6) Remove the iron from the joint.
- 7) Wait until it cools before moving the component or the PCB.

To make a good joint takes practice. To put the right amount of solder also takes practice. Too much or too little could result in a bad connection. Examine Figure 1, and notice the difference between too little and too much solder. Sometimes a bad connection can be turned into a good connection just by heating up the joint again. After it cools, the joint should be shiny and smooth. Practice several times until you get the hang of it. There

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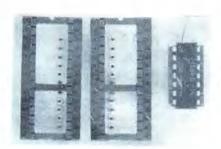
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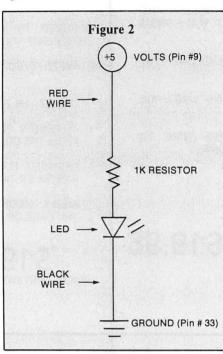
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is one more thing to remember; after all the soldering is done, clean the PCB with Radio Shack rosin cleanerremover.

Now that you feel more at ease with soldering, it is time to put your newly acquired talent to work. Yes, the pilot light. There are only four parts to this project. The LED, a 1K (K=1000) ohm 1/2 watt resistor, and two short lengths of colored wire (preferably red and black). That is it. Examine the schematic in Figure 2. This is a diagram on how the components connect together and to the computer. The first thing to do is mount the LED. You must decide where to put it. After that, you must check that when mounted, it does not interfere with the normal operation of the computer, i.e., short out or lean on other components and does not prevent the cover from fitting properly.

Mount the LED by drilling a 1/4-inch hole where the LED is to be mounted. Cut both sides of the resistor leads to about 1/4 inch. Solder one side of the resistor to the long end of the LED. Solder one end of the red wire to the other end of the resistor. Solder one end of the black wire to the other (short)

end of the LED. Twist the two wires together lightly and cut them about 18 inches long. This should be long enough to have the cover out of your way if ever you want to open the computer again.



Now, solder the other end of the red wire to inside of pin 9 of the edge connector. That is the five volts side. How do you get to pin 9? Simple, just start counting from the end closest to the back of the computer. All the top pins are odd numbered, so count 1, 3, 5, 7, 9. Make sure that you don't short out two pins with the solder. Finally, solder the black wire to pin 33, count that one the same way. Pin 33 is the ground return pin.

Place the cover on top of the computer (without the screws for now) and turn the computer on. The LED should turn on. If not, chances are that you got the wires to the LED reversed. In that case, unsolder the resistor and the black wire to the LED and resolder them the other way. Otherwise, you should not have any problems. Tuck the wire in the cover and place the cover back on. Make sure that the wire does not stick out and that the keyboard is sitting on the pegs properly. Turn the computer over and replace the screws. There you are, your first modification to your computer. Now doesn't that make your day?



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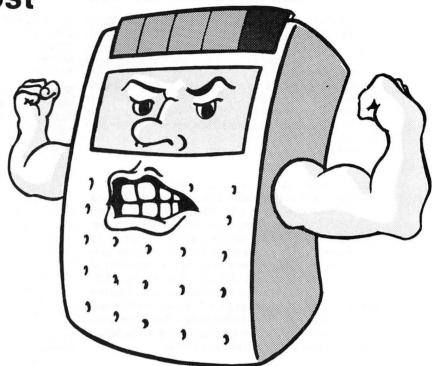
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Getting The Most From Your Cassette Recorder

By Norman Latner



hoosing a cassette recorder is, all too often, a hasty afterthought following the exciting and carefully thought out purchase of the Color Computer. However, after encountering endless I/O Errors and spending what seems like ages searching for programs located somewhere on your tape, you'll know you should have thought about it more.

Fortunately, the situation is not hopeless. You can make reliable, consistently high quality recordings by improving your present tape recorder and using good recording techniques and materials. And, if you're in the market for a new and better cassette recorder, I'll discuss how you can choose the most suitable unit.

Cassette recording with the Color Computer has a lot going for it. At 1500 Baud, it's five times faster than many of its competitors, allowing it to record an 8K program in less than 45 seconds. It's reliable and inexpensive. A brand name 60-minute tape can be bought for about a dollar in large metropolitan areas. It can store an amazing 675K bytes, or about 4 ½ times more than a \$5 Radio Shack disk. And while the cassette recorder can't immediately access a program located anywhere on the tape, or read as fast as the disk unit does, you will be able to locate programs fairly quickly using cue/review, speaker mute override and remote override features, which I'll discuss later. As we further

compare cassette to disk, we find that disks are far more prone to catastrophic failures. Don't ever turn the power switch off on a disk drive with a disk in place. Don't operate a drive in the presence of a strong RF field or any place where sparks from equipment turn-on might be close enough to disturb the unit. These disks may never again divulge their information to you. Disk drives can suddenly change from reading (playback) to writing (record) with no intervention on your part. The cassette unit, on the other hand, won't record unless you simultaneously press the Play and Record keys. And finally, a cassette recorder costs many times less than a disk system.

# The Ideal Cassette Recorder

If you could get the ideal cassette recorder for use with the Color Computer, it would have the following features: cue/review keys, a remote override switch, a speaker mute override switch, a record monitor switch and a tape counter.

The value of the tape counter is fairly obvious. You can tabulate your programs by tape counter number and access them more quickly and accurately. By setting the counter to zero prior to a loading or saving operation, you can get back to the start of the program very easily if need be.

A record monitor switch, a feature available on a number of tape recorders, allows you to listen in while the recording is being made. Hearing the process can alert you to such

(Norm Latner, an electrical engineer, works in a government laboratory. He is involved in research and development of nuclear instruments, and is a frequent contributor to scientific journals.)

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**ORDERS ONLY 800 426 1830** ORDER PROCESSING AND INFORMATION 206 581 6938 problems as recording with the computer in the high speed mode, (the "start tones" will sound much higher pitched than usual) or trying to record after erroneously typing CLOAD (there won't be any sound). It's reassuring hearing the two characteristic start tones followed by the crisp, static-like sound of the program code.

A speaker mute override, which could do you a great deal of good, is just another way of saying the cassette recorder's speaker is able to operate even though the plug in the earphone jack has turned it off. (That plug, of course, normally goes to the computer and allows loading.) The ability to hear the tapes loading is one of the most important aids available to you. It allows you to identify problem tapes by their muffled, mushy or wavering sound quality. It alerts you to programs accidentally recorded in the high speed mode. It lets you easily find the gap between programs. By locating and starting at this gap, you eliminate all those I/O Errors which occur when you attempt to load in the middle of a record. In addition, when used with the cue/review feature mentioned below, you can even hear the programs in fast forward or reverse. This allows you to move quickly through the tape while keeping count of the programs you've passed through. You can, for example, locate a program five ahead of your tape's current position by counting the noisy, followed by quiet, sequences. While it's theoretically possible to use AUDIOON to hear the cassette output through the TV speaker, there are some practical problems. First, an I/O Error resets this command, thus requiring constant re-entry. Second, the computer can't be doing anything else at the time — you can't set up to read another program while the first is still running. However, the speaker mute override is completely independent of the computer. The only reasona-

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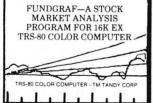
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PARSONS SOFTWARE, DEPT. G 118 WOODSHIRE DRIVE PARKERSBURG, WV 26101 bly priced recorder with this feature so far is Radio Shack's new CCR-82. If you're electrically knowledgeable, or can get help from a friend who is, it's easy to add this feature to your present recorder. It takes one resistor added to your recorder, or if you'd rather, you can build a separate box which gives you this feature plus a remote override switch. Details to follow.

A remote override switch will save you untold wear on your connecting cable, remote plug and jack as well as your patience. The remote jack, which permits the cassette unit to be turned on and off by the computer, also prevents you from operating the cassette recorder manually. By temporarily defeating this lockout, you regain manual control and can locate the tape anywhere you wish using Fast Forward, Reverse or Play. I've installed a switch to do this in my recorder or you can build it into the box mentioned above.

The final feature that you ought to have is cue/review. Cue/review keys, which are available on a number of cassette recorders, ordinarily operate like the standard fast

"You can make reliable, consistently high quality recordings by improving your present tape recorder and using good recording techniques and materials . . . Cassette recording with the Color Computer has a lot going for it."

forward/rewind. However, unlike these keys, cue/review also operates when the Play button is depressed, allowing you to hear the tape while fast forwarding or rewinding. This makes it possible to listen while the tape moves quickly, and then stop in the gap between programs, thus eliminating the bulk of I/O Errors.

And while we're talking about features of the ideal cassette recorder, we might add such niceties as a VU meter, or at the least, an LED, to indicate recording level. This helps you to arrive at the proper volume setting with a minimum of effort. A useful, but not essential feature is a linear slide volume control rather than the conventional rotary type. The setting of the linear control is obvious at a glance. End of tape-auto shut off is desirable, and by now, not too hard to get. However, be careful when using this, since the feature doesn't normally work in fast forward or rewind.

# What You Can Buy . . . Or, The Realities Of The Marketplace

Now that we've talked about the ideal tape recorder, let's examine what's commercially available. The basic require-

ments for a CoCo compatible recorder are remote and earphone jacks, aux or line or mic jack and six-volt operation. (A recorder that takes four cells is a six-volt type.) These features are available and you should have little trouble finding a unit which also has a tape counter and a recording indicator. Cue/review keys are available on the somewhat higher priced machines, some of which also offer linear slide pots. The next step up offers units which usually include an AM/FM radio (which you don't need), along with monitor and ALC switches (which you do need). It might take a little looking, but you can find the close to ideal recorder in several name brands, at larger stores.

Radio Shack had not made any great effort to tailor their recorders, both the CCR-81 and the now discontinued CTR-80, to the needs of the computer user. For the most part, they resembled standard audio cassette units. A few of the features we'd like are there while others, which could have been easily implemented, are missing. Both recorders allow remote override during fast forward and rewind, but not during play, and both have a recording LED and a counter. The CCR-81 has the cue/review feature missing in the earlier model. The newest addition to Radio Shack's cassette recorder line, the CCR-82, has this as well as remote override and monitor switches. Although the Radio Shack recorder represents one of the easiest choices, you can do much better if you're willing to spend the time and effort. Aim for the unit which offers as many of the desirable features as possible and fits within your budget. As a final note, avoid like the plague, a cassette recorder which has single button recording rather than the standard type which must have both Play and Record keys depressed together. It's all too easy to slip up and destroy your favorite programs.

There are two approaches to implementing the speaker mute and remote overrides, depending on your ambition and technical skill. In either case, you have to be able to solder, drill holes and otherwise work at a simple project level. If that's beyond you, or you can't get a technically inclined friend to help, then just skip to the next section.

The easier construction method consists of building a separate box which houses a small loud speaker, a switch, a resistor, two jacks and two plugs on short cables. A wiring diagram and suggested parts list are shown in Figure 1. There's nothing critical here, including parts layout. The switch can be any momentary type or, even better, a toggle switch with a center off, one side on, and the other side momentary. This arrangement frees you from keeping the switch held down during such chores as rewinding a tape. If you use this type of switch, connect the two outside lugs together and use this as one lead, with the center lug as the other. Another option you could consider is installing a foot operated switch, such as Radio Shack #44-610, at the end of a six-foot cable. This frees your hands entirely.

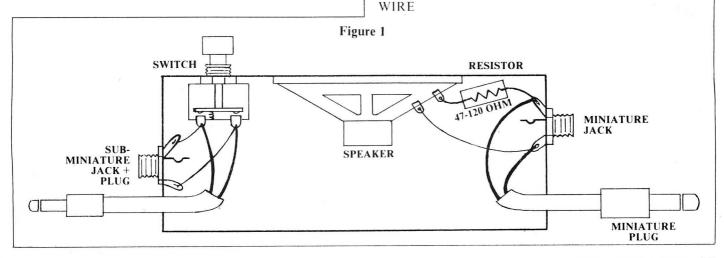
The particular value of the resistor (47-120 ohms) can be chosen to give a sound level that suits you. If yours is a quiet environment, you may want to use a value even higher than 120 ohms. To get the greatest flexibility, you could install a 500 ohm potentiometer in series with a 47 ohm resistor, allowing you to vary the volume as the need arises. While you can raise the resistance without problems, don't lower it much below 47 ohms, since this will decrease the signal available to the computer. Resistor tolerance, indicated by a gold or silver band, is unimportant in this application — use whatever you can get.

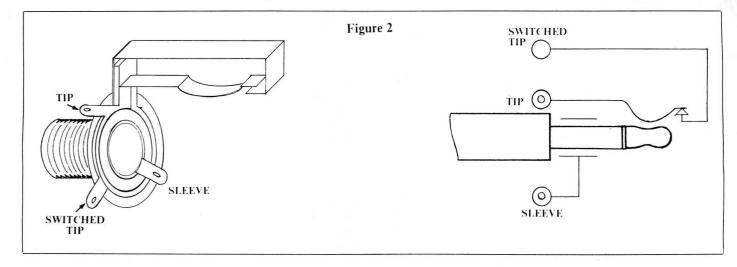
An important point to note is that you can't mount both jacks on a metal surface. The bushing of each jack is tied to one of its contacts, and this would short one jack to the other

# Improve Your Present Recorder

For those of you who want to improve your present recorder, the speaker mute and remote override functions can be added, and I'll describe how you can do it. While it's possible to add a recording monitor switch to most recorders, it's a lot more complicated and generally requires a schematic diagram, which puts it beyond the scope of this article.

PARTS LIST	
PROJECT CASE	RADIO SHACK
	#270-221 or
	222 or 233
2" SPEAKER	RS 40-245
1/8" MIN PHONE PLUG	RS 274-286
3/32" SUBMIN PHONE PLUG	RS 274-290
1/8" MIN PHONE JACK	RS 274-251
3/32" SUBMIN PHONE JACK	RS 274-292
RESISTOR	1/4 or 1/2 WATT
	47 to 120 OHM
	(SEE TEXT)





— a definite no-no. Pay particular attention to the connections on the jack. Although there are generally three solder lugs, you only use two — the "sleeve" and "tip" lugs. The "sleeve" is the one that's electrically connected to the mounting bushing, and the "tip" contact can be identified by inspection. The third contact, not used here, allows for switching. See Figure 2.

A very convenient solution for building this box is to use an old transistor radio. Almost everyone has an old, nonfunctioning radio in his basement or the top of the closet. Remove the innards, leaving the loudspeaker and the earphone jack, which might be either a miniature or subminiature type. Install a second jack, of the other type, in a hole you either drill or melt into the case. Make two holes for the cables and another for the switch. Solder all the connections as per Figure 1. Your original computer cable, except for the microphone (or aux or line) input which stays put, now plugs into the box you've made. The cables and plugs from the box, in turn, go to the tape recorder, and you're finished. You now can hear the tape as it loads into the computer and move or play the tape without pulling out the remote plug.

If you have the skill, a neater and more compact way of adding these features is to modify the recorder itself. First, carefully take the back cover off the recorder and put the screws in a small container. (Be sure to get the ones that are invariably hidden in the battery compartment.) At this point, the earphone and remote jacks should be visible. Sometimes they are on a subassembly, which might require loosening a few more screws. Now examine the earphone jack and locate the "tip" and "switched" contact. See Figure 2. Solder the resistor to these points without removing any of the leads already attached. If the jacks are attached to the printed circuit board, trace the leads and solder the resistor to the appropriate pads on the board. Now locate the tip and sleeve contacts on the subminiature, remote jack. In this case, you connect two leads rather than the resistor. These leads go to the switch, which will be installed somewhere on the case, or you can use the foot switch mentioned earlier, instead. Almost any kind of small switch can be used and you can locate it anywhere you can find the room in your tape recorder. Around the battery compartment is usually a good spot, since battery operation with the computer is unnecessary and undesirable. Drill the mounting hole, install the switch, solder the leads and reassemble the case. Now you're all set to hear your programs playing through the recorder's speaker and to override the computer's control by operating your switch.

#### Making The Best Possible Recordings

To make a good tape recording, you need a good tape. Not only does the magnetic tape have to be uniform and of good quality, but just as important is the tape transport mechanism within the cassette. Poor corner guide rollers or none at all, ineffective anti-friction sheets, non-rigid cases, and poorly made center hubs that do not turn freely can cause tape jams, uneven spooling and tape binding. Magnetic tape problems usually result from non-uniform oxide coating and can cause dropouts and varying volume. All of this translates into I/O Errors and headaches. Fortunately, these problems can be avoided by buying name brand audio tapes or shorter computer tapes available from reputable dealers. The 60-minute audio tape is relatively inexpensive and a good size to use. The 90-minute tape can also be used, but avoid the 120-minute or longer sizes, since these tapes are thinner and more susceptible to stretching and breaking.

The cassette tape you end up with should have a case which doesn't deflect with moderate finger pressure; the window area near its hubs should be of rigid clear plastic, not thin film; the hubs should move freely when turned with a pen. If the case is transparent, you should see corner guide rollers, preferably set on metal pins. The pressure pad, which holds the tape against the head, should be made of felt rather than sponge rubber, which deteriorates with age. And finally, the case should be held together with screws rather than glue to facilitate repairs if needed.

If you're reusing a tape, it's best to bulk erase it before recording. Bulk erasing reduces the noise level below the recorder's own erase head level. If that's not possible, at least erase it as a separate step prior to use. Put it into your recorder or tape deck, lower the volume to minimum, the ALC to 'Off' if possible, and set the unit to 'Record.' This method assures a clean tape.

Don't neglect periodic maintenance of your cassette recorder. Clean the record and erase heads, as well as the pinch roller and capstan, using readily available head cleaner fluid and swabs. Solvent grade alcohol, which contains little or no water, can also be used, but avoid rubbing alcohol which is 30 percent water. If you can see any oxide deposits on your tape heads, your unit is overdue for a cleaning.

Demagnetizing the tape head is also a good idea and is recommended after every 10 to 15 hours of machine use. A magnetic bias on the head will cause an increase in noise level and a loss of high frequency response which can cause I/O Errors. Relatively inexpensive demagnitizers are available, including a very easy to use unit built into a cassette case. You simply insert it as you would any cassette, and then set the recorder on play for a few seconds.

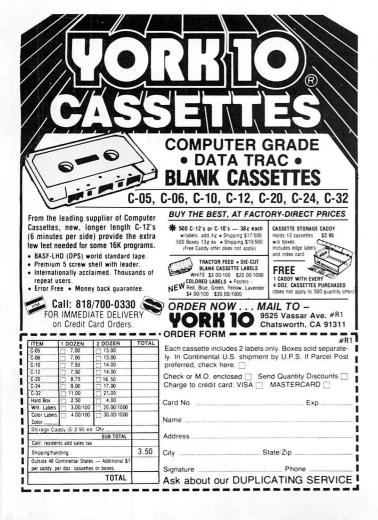
Automatic level control (ALC) is a mixed blessing. It relieves you of the burden of setting the recording volume, but it has some disadvantages. It takes about one-half second to operate, causing a sudden change in the volume of the starting tones at the beginning of each record. In addition, the setting it chooses may not be the optimum one. It's a compromise, but one that you can live with. However, if it's possible to switch the ALC off, do so for the best recordings.

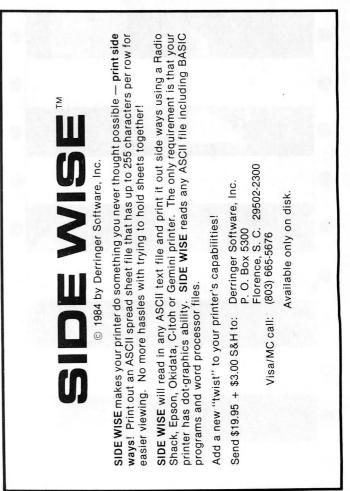
At this point, if your recorder doesn't have ALC, you'll need to determine the optimum volume control setting for recording. In general, the best results can be obtained by setting the level to record as high as possible with only occasional excursions into the overload region. This can be seen on the VU meter or recording LED if you have one. Without any indicator, you'll have to use a trial and error method. Start by setting the volume control to an arbitrary point, say three-quarters of the way up, and CSAVE a program. Next, remove the cassette and play the program back on a stereo tape deck (yours or a friend's). Watch the VU meters, or better yet, the dual series of LEDs, standard on newer decks. See if the recorded level is generally high, just below or occasionally going into the overload (red LED's) region. If so, you've been recording at the right level,

otherwise, make corrections and repeat the procedure until it's right. It doesn't take long. Once you've got the correct setting, mark the position with a dab of nail polish or paint, and always record at this setting.

While you're at it, you can also check your tape tracking. The cassette recorder used with your computer is monophonic and lays down a wide track which spans both the left and right channel tracks recorded by a stereo tape deck. Thus, when you play a monophonic tape on a stereo deck, the left and right VU or LED indicators should show an equal response if all is well. (Editor's Note: Many mono recorders normally record their single track off-center compared to the usual stereo track positions, so there can be as much as 3 dB of difference between the left and right channels when playing the tape on a stereo machine. In a few cases, you may be able to adjust head height to cure this problem, though it shouldn't have any ill effect when using the recorder with a computer.) If one side is noticeably different from the other, you have a problem. The cause could simply be due to oxide deposits on the recording head and easily cured by cleaning, or it could be due to misalignment of the recording head. This latter problem is sometimes spotted when a friend tries to read one of your tapes. Your tape, though it works well for you, gives him I/O Errors, and when heard on a good audio system has a mushy, wavering quality. You won't notice it because the error is present in both your recording and playback and thus tends to cancel out. However, this makes it difficult to share programs with friends. If you're technically inclined, you can readjust the alignment, otherwise get help (and skip the next paragraph).

The cassette head assembly generally has an azimuth





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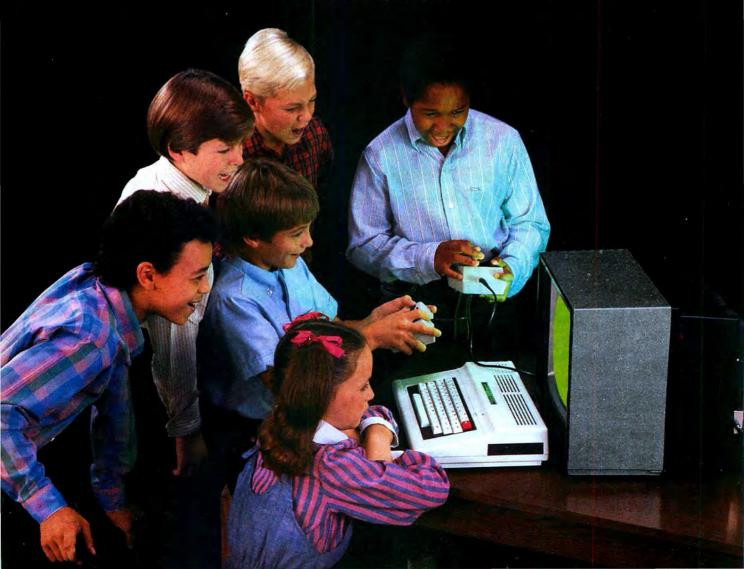
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Some cassette recorders have tone controls. If yours has one, set it to the highest (brightest) position when used with the computer.

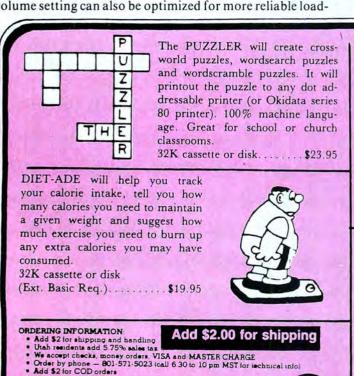
Although your own preferences should guide you, I find it best to leave a tape gap of four to five seconds between programs. With this length gap, you can usually rerecord a program in the same location after correcting the inevitable bugs. If the blank region is too short, it makes it difficult to locate the gap when searching through the tape. On the other hand, too long a gap makes it hard to tell whether it's really a gap or the end of the recorded area on your tape. This can lead to recording over, and thus destroying, one or more of your programs. To further safeguard your valuable programs, always punch out and remove the erasure prevention lug on the top left edge of the cassette after you've finished recording a side. You can always rerecord, if necessary, by putting tape over the opening.

Though not as critical as the recording level, the playback volume setting can also be optimized for more reliable load-

ing. Generally, there is a range over which you can get satisfactory results. Below this range, programs won't read in, while above, the computer will trip on noise and you may even hear sound breaking through the TV without AUDIOON. To define the range and then locate the best operating point, start at a low volume setting and try to read in a program. If this is too low, the steady 'S' at the top of the screen won't change. Raise the volume until you see the blinking 'F' when loading. This point, which you should temporarily mark with a spot of tape, is the minimum playback level. Now keep raising the volume until the computer responds to noise, either in the gap between programs or on a blank tape. At this level, the screen shows a reversed 'S.' Temporarily mark this maximum position. While the best place to operate within the range is the center, it's very convenient to use the recording setting if it's not too far off. Just leave the control at that point for both recording and playback. If you're not that lucky, paint another mark for the playback point and readjust between playback and recording when necessary.

Finally, a few hints on handling and storing tape are in order. Always avoid touching the tape with your fingers, since doing so might cause dropouts which can generate I/O Errors. When not in use, keep the cassette in its plastic case to protect it from dust and damage. Avoid prolonged exposure to temperatures above 110 degrees Fahrenheit, direct sunlight, high humidity and strong magnetic fields. Don't store them near heating appliances, TV sets or similar equipment.

Armed, as I hope you now are, go forth into the world of perfect recording.



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# An Open-Ended Exploration

#### By Joseph Kolar Rainbow Contributing Editor

he more you learn, the more you realize how little you know. That is true as far as the CoCo is concerned, and that is why every session at the keyboard is an adventure in learning.

The new CoCo owner bought his versatile machine for its graphics capabilities, among other things. We will explore the *POKE* and *PEEK* BASIC Statements as they apply to the text screen page.

I can't be sure what we'll do, but fire up CoCo and let us proceed line by line and investigate whatever comes to mind. It is a good, open-end way to learn and still have fun.

The text screen is what you see when you turn on the CoCo. It is your working area. *PRINT*@ locations 0 to 511 cover all 512 locations on the text screen. Key in:

1 CLS 10 PRINT@ 10, CHR\$(128) 100 GOTO 100

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

Line 10 tells CoCo to print at the eleventh space of the top row, a black square. This is due to the first upper left-hand location being designated as 0. To verify that this is so, add and *RUN*:

#### 11 PRINT@0,"12334567890";

Don't forget to add the semicolon. Now, delete the semicolon and see what happens. To help yourself learn, say to yourself, "Having deleted or omitted the semicolon, the black block, CHR\$(128), vanished. When the semicolon was restored, the black box was visible. So, what have I discovered?"

Insert an apostrophe or *REM* marker in front of 'P' in Line 11 and insert Line 9, copying the information in Line 11 ending with a semicolon. *RUN* and observe. Press BREAK, then delete the semicolon in Line 9 and *RUN*.

BREAK places the apostrophe (') marker in front of 'P' in Line 9. Delete the apostrophe in Line 11 and recheck both with and without the apostrophe.

You should have noticed that when Line 9 precedes Line 10, it is not necessary to add the semicolon. However, if you placed the information in Line 9 following Line 10, it is a different story! It is left to you to mull it over in your mind and figure out why this is so. There is no better way for a beginner to learn something than to work it out for himself.

When you are finished, you may DEL9, or if you prefer, keep it as a REM line in your program. It is harmless.

Please note that using PRINT@ allows you to print a string of characters, such as 'RAINBOW' when enclosed in quote marks and separated from the location value by a comma. You can print the ASCII character codes using CHR\$(x). The characters from 128 through 255 will create block graphics.

If you are unfamiliar with these graphics blocks, key in the following routine:

5 GOTO 200.

This line gets us around our routine, which we will refer to later.

200 FOR X=128 TO 255 210 PRINT@240, CHR\$(X) 220 FOR Z =1 TO 200: NEXT 250 NEXT X 299 GOTO 299

Each CHR\$ character from 128 through 255 will be printed, in rotation, in the middle of the display screen. Add:

#### 211 PRINT@270,X

This will give the numerical value of each shape displayed. It will also help you visualize each shape which will be directly above the second digit.

If you want to see the other characters, change Line 200:

#### 200 FOR X= 33 to 127

CHR\$(32) is a blank space, creating a space just as the space bar does. The low numbers are control codes and do not generate a visible display.

To keep this routine for later reference, put an apostrophe marker in Line 5. You will hold the routine harmless, but available.

Get in the habit of using the REM marker to hide or uncover program lines and routines. You will get lots of mileage out of this handy tool when you are experimenting or creating your own original work.

This PRINT@ Text Screen can be accessed using POKEs. The memory locations of the Text graphics page begin at 1024. This memory location is equivalent to PRINT @ 0. The memory locations continue just as the PRINT@ location and ends as memory location 1535, which is in the lower right-hand corner. It can also be called with PRINT@ 511.

Note that PRINT@ 511-0 and memory location 1535-1024 both equal 511. Allow 1 for the location you are subtracting and you get 512, the total number of all possible locations.

Each one of these text screen locations may be accessed by means of POKEx, y, where 'x' is a specific location from 1024 to 1535 and 'y' is a value from 0 to 255.

So, what is POKE anyway? It is a statement that allows CoCo to place into a designated location whatever text screen character you desire. It has other uses not within the scope of this article. Press BREAK and add:

#### 20 POKE 1066, 255 RUN.

This placed an orange block directly underneath the PRINT@ 10, black block.

PEEK allows you to look at a specified memory location to see what information, if any, resides there.

Press BREAK, PRINT PEEK(129), and ENTER. This memory location is checked on I/O Error message when CLOADing a program from cassette. A zero means that memory is no good and if a one is returned, it signifies that the tape is no good. Try this:

#### PRINT PEEK(1066) ENTER.

The value of 96 is returned. This 96 represents 'blank' (empty). The reason for this is that we are not in the program, having broken out and location 1066 reverts to its original state, 'blank'.

The observant newcomer will notice that CHR\$(96) is a reversed '@'. Verify this by unmasking Line 5. (Remove the apostrophe.) Mask Line 200 with '. Then add:

#### 201 FOR X=96 TO 96 RUN.

This is a lazy person's way to substitute a single value in a FOR TO statement. If you used 201 X=96 you would still get the correct answer, but you'd also get an NF Error in 250. If this was an integral part of a real program, it would bomb out unless Line 250 was deleted.

This 'one value' hint is valuable when you may be experimenting with different values. OK! Press BREAK, mask lines 5 and 201 and unmask Line 200.

A disturbing fact remains. CHR\$(96) and the 96 that was revealed by PEEKing at memory location 1066 are different. There are some differences between the ASCII characters using CHR\$ and the characters that CoCo recognizes from 0 to 255.

To compare the *POKEd* characters with the CHR\$ characters, change Line 200 and add Line 211:

#### 200 FOR X=0 TO 127 211 POKE1269, X RUN

Let's make it neater. Press BREAK and change lines 210 and 211:

#### 210 PRINT@234, CHR\$(X) 211 PRINT@238, X

The graphics blocks from 128 to 255 are the same. If you want to check this out change Line 200 to include whatever values you care to compare.

Remember, the character displayed at the left, if any, is the ASCII code, and the character on the right is what CoCo will read for the same value when

it is POKEd into a memory location.

You are urged to make a reference table of the two sets of characters, side by side, insofar as they differ.

Now press BREAK, and mask Line 5 again.

To demonstrate that one set can be substituted over the other, Line 23 will POKE an orange box over the black box at PRINT@ 10 and Line 24 will superimpose a black box over the POKEd orange box, using PRINT@. Add and RUN.

#### 23 POKE 1034, 255 24 PRINT@42, CHR\$(128)

POKEing graphics characters is one quick way to cover large areas. Press BREAK and add:

6 GOTO 300 300 FOR L=1024 TO 1055 310 POKE L,255 320 NEXT L 500 GOTO 500

This creates an orange line that covers all the text screen locations on the top row. Add:

330 FOR M=32 to 63 340 PRINTM, CHR\$(175) 350 NEXT M

Using blue, CHR\$(175), we can use PRINT@ M, all locations in the second row to fill them in. RUN BREAK and to make a left border add:

360 FOR L=1024 to 1504 STEP 32 370 POKEL.255 380 NEXT L

Since we want only one vertical column, in Line 360, we start at 1024 and skip 31 columns to put a dab of color in each 32nd, or left-hand, row. Purists will note that we should begin with location 1056, but it is easier to go over the corner block in the top row.

Using PRINT@, we will create an orange border on the right-hand side. Press BREAK and add:

385 FOR M=479 TO 31 STEP-32 390 PRINT@M, CHR\$(255); 395 NEXT M

We went from bottom to top for a change of pace. Note that we were unable to use FOR M=511 etc. because filling in this corner box would cause the screen to scroll up one row. Omit the semicolon at the end of Line 390 and watch a disaster area. We could fill that corner location safely with a *POKE* to avoid that pesky scroll. We do so when we create the bottom border. Press BREAK, add and *RUN*:

400 FOR L=1505 TO 1535 410 POKEL, 255 420 NEXT L

We can *PEEK(x)* a value while we are in the program. We will ask CoCo to check if memory location 1503 is orange, (255); *PRINT*@ 237, "ORANGE" and go ahead and create the bottom border. If 1503 is not orange, forget about the bottom border and skip to the end of the program. Press BREAK, add and *RUN*:

399 IF PEEK(1503)=255 THEN PRINT237,"ORANGE"; ELSE 500.

To verify that this works, substitute 255 in Line 399 with another value and try it. As an alternate, pick an arbitrary *POKE* location, from 1024 to 1535 to see if it is orange.

You can *POKE* characters, other than the graphics values but, except for an asterisk or plus sign, which create

neat borders or accents, it is silly to create a border of reversed @. Listing I will show an example of *POKEing* alphabetic characters.

At this time your mind is racing ahead with projects to try out. Before you do, put in the three missing blue sides of the inner border.

And, let's have some fun! Create a half-screen full of reversed @. Adjust the *POKEd* locations so the display is centered horizontally on the screen with a green band on the top and bottom. Open a partial row in the middle of the screen, leaving one blank space at each end and *POKE* your first name into the cleared space. Create a pause so your name may be read and then blank out the name slot with some graphics block.

Doing this exercise will give you ideas to either modify and improve what you have created, or go off into a frenzy of creativity in another direction.

Listing I is an example of using all *POKEs* to create a demonstration program which is somewhat similar to the exercise above.

One advantage of using the graphics characters, 128-255, is that you get to

use all the colors available on your palette. You need not be an artist to have fun creating whatever your mind's eye conceives. You may wind up with some pretty impressive concoctions.

Some notes on Listing 1. Line 140 puts the top row of graphics characters on the screen the hard way — one at a time with an appropriate pause. Compare Line 140 with lines 180-210, which create the bottom segment.

There is no *RETURN* after Line 310, a *GOSUB* routine. This was a boo-boo. Since a similar routine follows, this effectively makes the pause 230 instead of 200. Can you see why? No harm was done and I failed to notice it.

Line 160 has no GOSUB pause between the two POKEs because they go onto the display as one unit. Line 230, the left border has a small pause between units so it blends nicely with lines 250-280, which override the text. Line 100 does not have the 'short' pause. It seemed to look better to have 0! come on as a single unit. The 'long' pause is used only before and after HELLO!

Read the listing and figure out what each program line does. Except for the two pause routines at the end, it is a

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linear program and each routine follows exactly as it appears on the screen.

Hopefully, you will have some ideas to modify, expand or enhance this listing, so what are you waiting for? Note Listing 2 should not be keyed in. Just compare it with Listing 1. It is the same as Listing 1 except it is tightened up using multiple program lines. Two changes, the missing RE

TURN was added to Line 310 and in Line 10, 20 was changed to 10 due to deletion of Line 20 from Listing 1 and subsequent UL Error message. Which listing would you rather key in?

#### Listing 1:

ø '<LISTING1>

1Ø CLS

2Ø C=RND(255)

3Ø IF C<144 THEN 2Ø

4Ø GOSUB31Ø

50 POKE 1260,96

6Ø POKE 1261,72:GOSUB32Ø

70 POKE 1262,69:GOSUB320

80 POKE 1263,76:GOSUB320

90 POKE 1264,76:GOSUB320

100 POKE 1265,79

11Ø POKE1266,97

12Ø POKE1267,96

130 GOSUB310

14Ø POKE1226, C: GOSUB32Ø: POKE1227

, C: GOSUB320: POKE1228, C: GOSUB320:

POKE1229, C: GOSUB320: POKE1230, C: G

OSUB320: POKE1231, C: GOSUB320: POKE

1232, C: GOSUB320: POKE1233, C: GOSUB



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320: POKE1234, C: GOSUB320: POKE1235, C: GOSUB320: POKE1236, C: GOSUB320:

POKE1237, C

15Ø GOSUB32Ø

16Ø POKE 1268, C: POKE 1269, C

17Ø GOSUB32Ø

18Ø FOR X=13Ø1 TO 129Ø STEP-1

19Ø POKEX,C

200 GOSUB320

21Ø NEXT X

22Ø GOSUB32Ø

23Ø POKE 1258,C:GOSUB32Ø:POKE125

9.C

24Ø GOSUB32Ø

25Ø FOR X=126Ø TO 1267

26Ø POKEX,C

27Ø GOSUB32Ø

28Ø NEXTX

290 GOSUB320

300 GOTO 10

310 FOR Z=1 TO 200:NEXT

320 FOR Z=1TO 30:NEXT

33Ø RETURN

#### Listing 2:

#### Ø '<LISTING2>

10 CLS:C=RND(255):IFC<144 THEN 1 0:GOSUB310

50 POKE 1260,96:POKE1261,72:GOSU B320:POKE1262,69:GOSUB320:POKE12 63,76:GOSUB320:POKE1264,76:GOSUB 320:POKE1265,79:POKE1266,97:POKE 1267,96:GOSUB310

140 POKE1226, C: GOSUB320: POKE1227, C: GOSUB320: POKE1228, C: GOSUB320: POKE1230, C: GOSUB320: POKE1230, C: GOSUB320: POKE1230: POKE1231, C: GOSUB320: POKE1232, C: GOSUB320: POKE1233, C: GOSUB320: POKE1235, C: GOSUB320: POKE1236, C: GOSUB320: POKE1237, C: GOSUB320: POKE1237, C: GOSUB320: POKE1237, C: GOSUB320

160 POKE 1268,C:POKE 1269,C:GOSU 8320

180 FOR X=1301 TO 1290 STEP-1:PO KEX,C:GOSUB320:NEXT:GOSUB320

230 POKE 1258,C:GOSUB320:POKE125 9.C:GOSUB320

250 FOR X=1260 TO 1267:POKEX,C:G
OSUB320:NEXT:GOSUB320:GOTO10

310 FOR Z=1 TO 200:NEXT:RETURN 320 FOR Z=1TO 30:NEXT:RETURN

# **Block Out Those** Troublesome Granules With DISKTEST.UTL

#### By Charles C. Zimmer

id you ever pay the price of a good game program to buy a box of diskettes and carefully ration them out, only to find six months later one has a bad spot on it? You know if you take it back after six

(Chuck Zimmer is employed by Honeywell Information Systems, Inc. in Billerica, Mass. For the past 15 years he has worked in engineering, procurement and planning of all types of disk storage products.)

months you are going to get some raised evebrows for claiming it had a bad spot on it when it was new. Or do you have some that have been used a lot on certain files to the point of producing errors, but the rest of the disk is practically new? You don't want to throw it away, but there's not a positive way to be sure you can avoid those bad spots.

DISKTEST. UTL can help you overcome these problems and feel better about those good disks you have. The program gives your disks a thorough test by writing and reading all tracks with a variety of data patterns to check for errors. The test is contrived to produce the worst-case situations for data patterns and head positioning sequences so that it is not only a test of the diskette media, but is also a good test of the positioning accuracy of the drive.

If bad granules are found, the program writes a file on the disk called "DEFLOG.###" (### is the diskette



number) and all of the granules that contained an error are assigned to this file. This way they cannot be assigned to any of your files and therefore, are out of your way.

If you have a printer you are alsogiven a one-line report of the test results. Your printout sheet can be reinserted in your printer so you can maintain a continuous diary of the test history of your disk library. This can help you in the future if it is necessary to reinitialize a disk. If you do not have a printer, you are given the chance to write down the list of bad granules for future use.

#### Some Notes Of Caution

1) The program does a complete overwrite of the disk, including the directory track, so be sure you no longer need or have otherwise backed up all the files on the disk.

2) If you elect to use disks with errors "flagged-out" (meaning bad spots have been "marked" and made unavailable), please remember that the Radio Shack Disk Operating System command BACKUP will be aborted if a read error is encountered. This means you will need to back up individual files by loading them into the computer and saving them to another disk. You cannot count on being able to back up the entire disk at once with the BACK UP command. (See "Compatibility Note" for a way to overcome this limitation.)

#### How You Use Diskettes

Each individual needs to make his

own decision about using disks with errors; this can be influenced by your overall procedures for handling files. In my case, I have a printer which produces the ultimate backup, but I also use cassettes for important files and do double program saves on my disks, plus periodical transferring of files to other disks.

I use flagged disks for program development where there is a lot of traffic, which tends to wear out the remaining good places. When a program is finished and put in service, it is transferred to a good working disk for regular use. If you have other utilities for recovering from disk crashes, this can make you even more comfortable about using flagged disks.

The balance of this article is written assuming you plan to save and use flagged disks so all of the procedures are discussed. If you choose to discard disks with errors, the program is somewhat simpler to run and you will be notified of all you need to know.

#### How The Program Runs

The program is self-prompting, and as it runs a series of messages will appear on Line 15, with prompts on Line 16 for the required responses. These appear whenever the program stops to accept an input from you.

An operating flow chart is shown in figures 1-a and 1-b. On the left are the messages and prompts which appear during the program. The information on the right side of the figures provides more explanation, and shows the program flow from stop to stop. The hi/lo legend beside the screen information tells which audio signal is given at the various stops. A high signal is to notify you that a normal stop has been reached. The low signal indicates an error condition. The program contains checks on inputs, so out-ofrange inputs will not interrupt the program at critical places. Please note the disks must have been previously initialized with a DSKINI command.

The program begins by asking you to adjust the volume on the TV. Then you are asked to enter the drive number for the test, and to select between a short and a full test. If you want a printout of the results, you are next given the chance to input the day's date (six digit string). Printout or none, you then reach the main starting and stopping point called the DISK CHANGE point in Figure 1-a. Here, you insert the disk to be tested and when the test is completed, you will return to this point. You may then remove the disk and

Scre	en Messages and Prompts	Program Stops	
	E TURN UP VOLUME ON TV TO CONTUNUE	VOLUME ADJ Adjust volume for desired level	
? (nu	mber entered appears her DRIVE NUMBER (0-3)	hi v on (ENTER)	
   (S)H0	(no message) RT TEST (OTHER)FULL TES	TEST SELECT  Thi v on (RESP)	
   (P)FO	(no message) R PRINTOUT (OTHER)CONTI	PRINT QUESTION - Decide if printout is wanted   PRINT QUESTION - Decide if print QUESTION - Decide if print QUESTION - Decide if printout is wanted   PRINT QUESTION - Decid	
1 ? (da	te entered appears here) DATE (YYMMDD)	on (P)    DATE ENTRY - To appear on printout	nto
	T OR CHANGE DISKETTES MENCE TEST (Q) UIT	DISK CHANGE - We start and end here with disk change   hi v ->-> on (\Omega) ->-> to END and OK prompt.	je.
1 ? (nu	mber entered appears her DISKETTE NUMBER (###)	on (C)  Pe)   NUMBER ENTRY    hi v  on (ENTER)	
1 (	OPERATION: FILE CHECK	V (Not a stop, Information only)	
	TRACK ERROR-CAN'T CONTIN. TO RESTART OR GUIT		-)-
' \NO FIL	PRESENT LOG PRESENT LES NO DEFECT LOG TINUE (OTHER) ABORT TEST	no error  / PILE CHECK POINT - A chance to be sure you want to overwrite the entire disk v-> on (OTHER) ->->->->->->->->->->->->->->->->->->->	)-
ERROR	IN LOG - WILL TEST ALL (no prompt)	V (Not a stop - momentary error message if syst	em

insert the next for another test (repeating the test sequence) or quit, in which case the program ends in an orderly manner. When you continue from this point, the program makes a stop for you to enter the number of the diskette (up to 999).

After this, the program checks to see if files exist on the disk and also if there is a defect log file from a previous test. You are told of these findings at a stop called the FILE CHECK POINT. If you had previously tested the disk and it had defective granules, the program recovers this information by reading the old log and saving the numbers of the bad granules previously found. During the test sequence, the program will not take the time to retest the old bad granules because we want to be conservative and not think something that was once bad has become good again.

Perhaps the most important feature of the FILE CHECK POINT is when the program stops. The upper half of the screen is showing you the first sector of the directory entries (Sector 3 on track 17), and you will see your filenames to help you recognize that you have loaded a disk containing files; they will be completely overwritten if you proceed with the test. If you made a mistake, this is the time to abort the test (the prompt tells you how).

If everything is OK you press 'C' to continue. I have used 'C' where possible as the go-ahead response. This makes it easier to work your way through the

prompts.

You then come to the FIRST DE-FECT ENTRY POINT shown at the top of Figure 1-b. Here you are shown a defective granule map. You can manually enter defective granule numbers that you want to avoid and they will be incorporated in the defect log. Time will not be spent testing them. You will enter the granules from an old printout or manual log if the disk has been so totally crashed that the old log can't be read, or if you have used a bulk eraser on the disk. Upon continuing from this point the actual testing finally begins.

During the test sequence the upper half on the screen is the actual disk I/O buffer, so you see the graphics representation of the patterns being written to and read from the disk. The lower half of the screen contains a table giving the progress of the test, and the area of the disk being tested at the

moment.

You should know two things about the test cycle. First, the program uses the Radio Shack DSKCON ROM routine to actually perform the test.

This is a powerful routine which not only performs seeks and reads or writes, but also performs retries in the event of an error. Many times you can tell when a read error occurs because the drive "recalibrates" (positions to track 0 and then back to the commanded track) four times in an attempt to perform the operation successfully. If after four attempts it is unsuccessful, an error code is created indicating the granule is bad. "Transient" errors, where the operation is succussfully performed within the four tries, are not counted as "hard errors" and therefore are not logged.

If you notice the granule number during transient errors, you may wish to manually flag this granule bad at a later point in the program.

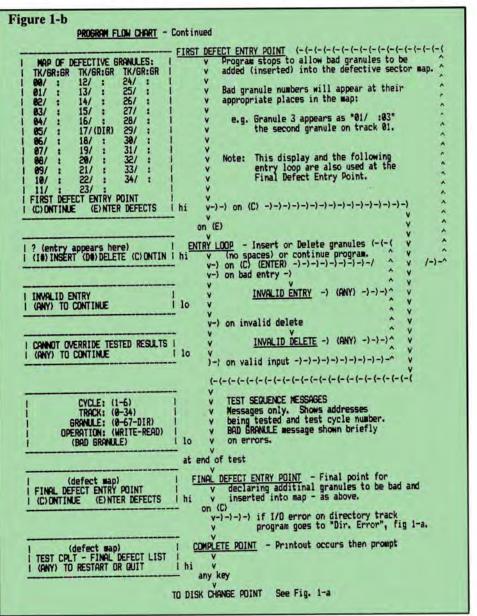
The second thing about the test cycles is that watching the screen and listening to the rhythmic operation of the drive can be hypnotic, so if you fall asleep

please don't send me a bill for lost computer time.

The testing takes from four to 10 minutes, depending upon an option discussed later.

After the test is finished, you come to the FINAL DEFECT ENTRY point and are shown the defective granule map again (new bad granules are in reverse video). You may then manually flag additional granules as bad. This is another important step in the program for the following reason: if there is a bad spot on the surface of the disk, how do you know how big it is and how do you know that it lies only in the center of the track where the error occurred? The answer is you don't know how big it is, nor do you know that the edge of it doesn't extend a little over onto a neighboring track. The adjoining track works at this time, but may cause an error later.

To handle this little trauma and get



some sleep at night, I arbitrarily decide the two granules physically adjacent to the one having the error are also bad, and I manually flag them as such at this point. The granules you will flag are numerically two granules above and below the bad one so that, for example, if granule 50 is bad you will enter I48RETURN and I52RETURN when in the ENTRY LOOP of Figure 1-b. If you are not having a printout, this is the time to manually write down the defective granule numbers in a media

log of some sort.

Upon continuing from the final defect entry point, you will see the file allocation table being created (if there are bad granules). You will then see a directory entry created for the DE-FLOG.###" file; it will be "killed" (first character set to zero) if there are no bad granules. There will be a pause and printout (if this is elected), and the program returns to the DISK CHANGE POINT from where you end or begin another test.

#### **Initialization Notes**

Page 58 of the Radio Shack disk manual describes bytes 0-55 of the sector as "system controls" information. Technically, this is a "header" field which is written only when the disk is initialized, and it identifies the upcoming sector number to the controller. The controller always reads this header before reading or updating the data field. In running DISKTEST. UTL, you may detect errors not caused by defects in the media, but because a system glitch

```
Figure 2
                                                 DEFECT LOG PRINTOUT SUBROUTINES (OKIDATA 92 Codes)
                                                               ----- PRINT ID SUBROUTINE - BEGINS WITH A PRINTING DRIVER
                                                                                                                           Set computer baud to 2400 baud or for these rates: 300 - 600 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 1200 = 
      POKE 149,0:

POKE 150,18:

Set LSB of Midth = 96 In Set LSB of Set
                                                                                               PRINT#-2, USING"x xd#xx x
                                                                                                     -----Print diskette number
                                                                                               If 80 col-only there will not be enough room on the line for all of these items. Substitute PRINT#-2, USING" * * ";RIGHT$(LN$, 3), D$;:
                                                                                                                             Return from PRINT ID subroutine
       RETURN
                                                                                                               PRINT LOG SUBROUTINE - BEGINS BY PRINTING A CHARACTER INDICATING THE CONDITION OF THE GRANULE
       line 235 ---
                                                                                                                            Clear gran counter to zero
Start of loop to scan granule array
       FOR X=0 TO 67:
                                                                                                                                                                                       (-) for a granule found bad in a previous test
(") for grans you declare bad in in this test
(.) where an error occurred in this test
(least sig. digit of gran #) for good granules
       IF 6(X)=&HB9 THEN PRINT#-2, "-";
ELSE IF G(X)=&H99 THEN PRINT#-2, CH$(34);
ELSE IF 6(X)=&HE9 THEN PRINT#-2, ".";
        ELSE PRINT#-2, USING"#"; X2;
        line 240 ----- PRINT MOST SIGNIFICANT DIGIT OF GRANULE # After each 10 granules
                                                                  Note: If 80 col-only there is not enough room on the line for these extra tens digits. Delete all PRINT#-2 statements this line.
                                                                                                                                    Increment gran counter. If 10 done reset the counter and print a superscripted, bold, double width "Tens" digit.
        X2=X2+1: IF X2=10 THEN X2=0:
       PRINT#-2,
CHR$(27);CHR$(74);
CHR$(28);CHR$(31);
CHR$(27):CHR$(84);
PRINT#-2,USING"#";X/10;
PRINT#-2,CHR$(73)
                                                                                                                            Set superscript printing
Set double width print mode
Set emphasized (bold) print
Print the "Tens" digit for the next ten granule numbers
Start of control codes to restore normal printing
         PRINT -2,
CHR$ (27); CHR$ (73);
CHR$ (28);
CHR$ (27); CHR$ (75);
NEXT ELSE NEXT
                                                                                                                            Stop emphasized printing
Set 12 cpi printing again
Stop superscript printing
Go to next granule in FOR loop
         line 245 ----- COMPLETE PRINTING OF DEFECT LOG
                                                                                                                            Since all print commands used (;) for no carriage return & line feed you provide a CR/LF here, then end subroutine
         PRINT#-2, "": RETURN
         Sample of log printout with 12 cpi matrix printer:
         Sample of log printout with 10 cpi 80 col-only printer:
         101 831124 01234567890123-567890123"5.7"901234567890123456789012345678901234567
```

— or yes, operator error — causes header areas to be garbled (written over). If you suspect this may have happened, you can reinitialize the disk (DSKINI) to rewrite these areas anew. This is one case where you may find that disks once bad do become good again. Bulk erasing before DSKINI will really give a clean start.

Compatibility Note

DISKTEST. UTL is compatible with the Disk Backup Utility by Roger Schrag in the December 1983 RAINBOW, in that his program will back up disks which have been tested with *DISKTEST*. UTL. The good sectors in the granules flagged by DISKTEST.UTL will be copied to the backup disk, and the sectors having errors will be bypassed by the backup program. After running the backup, you may want to KILL the DEFLOG.### file which was transferred to the backup disk and is irrelevent on the backup copy. As mentioned in the "Backup Utility" article, you cannot back up to a flawed disk, so you should use only disks found error-free by DISKTEST. UTL.

#### **Program Preparation And Options**

There are a few things to go over before you begin typing in the program (Listing 1). Some of the points are technical, relating to your system configuration, and some are "cosmetic" options allowing you to adapt the program to your preferences.

First the functional subjects:

#### **Memory Requirements**

If you have a 32K machine the complete program will fit easily, including comments so you can go on to the next point. If you have a 16K machine all of the functional program will fit, but it will be necessary to delete some non-essential information. You should delete all lines beginning with 'starting at Line 30, delete all but the program name in Line 10, and delete the PRINT statement in Line 320. There is another option for 16K users to gain additional memory, and that is to insert a PCLEAR 1 statement at the end of Line 15. This will free up an additional 4608 bytes (three graphics pages), which is more than adequate for the complete program, including comments.

A PCLEAR 1 can make it necessary to cycle the power switch off and on in older machines in order to regain all four graphics pages for running your next program. Do not clear all graphics pages because special machine language routines are stored in graphics Page 1.

#### Systems With No Printer

If you wish, you can enter all of the code, including the printer sections, in anticipation of the future addition of a printer. You can avoid unnecessary menu steps dealing with the nonexistent printer by changing the end of Line 315 from . . . . GOSUB265:GO SUB200:GOTO350 to the following: . ... GOSUB265:P=0:GOTO350. Technically, all that is necessary is to delete the GOSUB 200 since all BASIC variables are initialized to zero at RUN, but this just seems a little more positive to me. If you do not wish to bother with the printer code at all, it may be omitted as follows:

Omit lines 195-205 Omit lines 220-245 Omit the GOSUB 200 in Line 315 Omit the IFP=1...ELSE code in 330 Omit Line 620

**Adapting To Your Printer** 

The program as listed contains printer driver codes and control sequences required by my printer, an Okidata Microline 92, and uses 12 cpi (96 column) printing. To assist you in adapting to other printers, Figure 2 gives a statement-by-statement description of the defect log printout subroutine. This explains what each step does so you can follow the same logical sequence using control codes for your printer, and come up with the same results. Special instructions are included to cover printers that are 80-column only. A sample of the output is shown at the bottom of the figure.

#### **Creating Your Own Report**

If you want to have an output that is less cryptic than my one-liner, you can write your own report subroutine to replace lines 225-245. Subroutine 225 is called at the end of the program in Line 620 and works with the following variables.

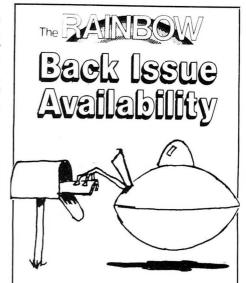
ARRAY G(69) in which the first 68 elements 0-67 contain one of four values representing the condition of the granules of the disk: Hex FF (OK), Hex B9 (bad from a previous test), Hex 99 (tested OK but declared bad by you in this test), and Hex E9 (bad due to an error detected during this test).

DN variable containing diskette number.

D\$ string variable containing the date.

D1 contains the device number for the test.

T\$ contains the test type, "Sh" or "Lg" for short or long test.



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	SHIPPIN	TOTAL IG & HANDLING	φ2.50	_
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#### Length And Comprehensiveness

The DATA statements in lines 460 and 465 control the data patterns and the sequence in which the tracks are tested. A longer test gives more confidence in the results than a short test, and the program provides you the option of making a choice between time and comprehensiveness. Line 460 does a rotating, worst-case pattern test (about six minutes), and Line 465 does a 1,0 test (about four minutes). Either alone is a complete test and both together are quite comprehensive. There is more information on these tests in the technical details section for those so inclined. If you think 10 minutes per diskette is a good investment, then both 460 and 465 should be used.

#### **Drive Number**

This provides for entering the number of the drive to be used for the test. If you have a single-drive system and wish to avoid this unnecessary menu step, you can delete the *GOSUB 255* in Line 315. You can also delete lines 250 and 255 entirely, but this is not necessary.

Now a couple of fun options:

#### **Background Color**

The screens are formatted with information fields blocked out in green according to the way CoCo prints to the screen. You can change the surrounding background to any of the eight-plus black colors by substituting your color code in the Line 20 statement BC=3. For a black background color, we need to fool CoCo and use a value for BC = 1/16. Color code 3 (blue) is in the program because it produces a nice gray-scale contrast on a black and white TV. Happy viewing.

#### **Audible Signals**

Two strings are played at appropriate times, E\$ for error conditions and A\$ for attention points (usually stops). These reside in Line 285 and sound like crickets. If you would prefer something different, please feel free to wax musical and redefine these strings to suit your tastes. Just keep in mind that we're close to the memory limit in 16K, and also that a long string may make it necessary to adjust the amount of string space CLEA Red in 15.

#### **Debug Aids**

Here are some suggestions to help you debug the program.

#### Scratch Disks

The first and most important thing to remember is that after you have typed

the program, save it to disk and then take the disk out and insert a scratch disk to use for debug. Do not make your test runs with the disk containing the program in the drive because the execution of the program overwrites the disk! Another reason to use a scratch disk for debug is that the program contains machine language routines which are poked into memory. Errors in the ML code, or errors in the poking code, can cause CoCo to crash. The voice of experience speaks.

#### **Shortened Test**

The second tip is to shorten the test cycle so you can get all of the menu and program control code working without long waits for the test process. Listing 1 contains a "commented" Line 475 which does a short read of tracks 0-3. This is only for use during debug, but will not hurt anything if executed during actual running of the program. Line 490 causes the program to skip over the test codes contained in Line 460, so for debug, Line 490 can be changed to make it skip even more codes. For a short debug run remove the 'in Line 475, change the TO70 in Line 490 to TO120, and use the short test option. This should reduce the "test cycle" to less than 10 seconds. When finished debugging, don't forget to recomment Line 475 (insert 'before DATA), and change the Line 490 TO value back to 70.

#### **Forced Conditions**

There are a number of branches in the program that may never be used unless you encounter the right conditions. Many of these deal with error processing. You can force these branches by temporarily editing the program to insert the right conditions at the branch points. You should observe the rule to do only one at a time and be sure to delete the temporary code before going on to the next branch. Here are the places to modify:

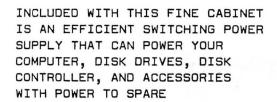
•	-	
Insert		
EC=1:	after GOSUB35:	in Line
Insert		365
EC=1:	after GOSUB35:	in Line
Insert		390
EC=1:	after	
	EC=USR2(X3):	in Line
Insert		535
EC=2:	after	
	EC=USR2(X3):	in Line
Insert		535
EC=1:	after NEXTX4:	in Line
Insert		590
EC=1:	after NEXTX4:	in Line
Insert		605
X2=100:	after	
	G(X1)=&HB9:	in Line
	,	430

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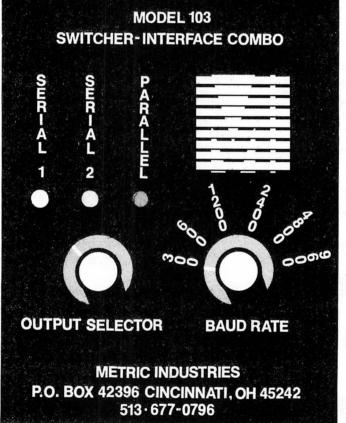
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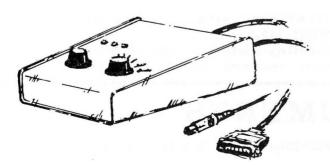
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#### **Technical Information**

The information that follows is provided for persons wanting to know more about the program and the testing of magnetic recording media. This information need not be read to enter and use the program.

#### Recording Codes

When the drive records data on the disk, what it does is magnetize the iron oxide material moving under the head in a direction along the track. As the stream of bits is fed to the drive, the direction of the magnetization is switched back and forth along the track according to an encoding algorithm. The effect is equivalent to producing a series of small bar magnets laid end to end along the track, except they vary in length and each successive one is turned around (of opposite magnetic polarity) with respect to its neighbors.

Later on, when reading the track, these small magnets are moved under the head and each time the junction between two adjoining magnets passes under the head the magnetic flux through the head reverses, causing a small voltage to be induced in the head. This signal is amplified and processed to become the data sent back to the computer. What is important is the time sequence of these "flux reversals," because this is what determines if they are translated into ones or zeros.

The point of this discussion is if we want to test the media, what we want to do is find data patterns that let us

put flux reversals at all of the places they can be, and then read the disk to see if they are properly recorded. Some patterns of flux reversals are harder to recover than others, so our test can include data that will produce these worst-case patterns as well.

The main reason some patterns are hard to recover is because if the magnets are not all the same length, the short ones, being crowded and under more pressure, tend to get longer making their long neighbors shorter and shifting the point at which the flux reversal occurs. This produces what is called "peak shift" in the read signal which causes timing and data errors.

The standard data pattern used to create a worst-case peak shift is a repetitive Hex DB6. Since this is a 12-bit value it is sent to the drive in a 3-byte sequence, DB 6D B6, etc. Figure 3 shows five data patterns used in this test, the first of which is the DB6 pattern. For each pattern there is a line of asterisks representing where the flux reversals would occur along the track when the pattern is recorded. The symbols '(' and ')' show the direction of peak shift due to the magnetic crowding described above.

If you look over the set of patterns, you will see places where flux reversals can occur that DB6 does not test. It is for this reason that multiple patterns are used. Patterns 6DB and B6D together with DB6 produce what is known as a rotating worst-case pattern test, wherein all data 1 bits are subjected to peak shift in both directions.

In contrast, the Radio Shack disk initialization routine writes a repetitive FF pattern which tests all data 1 bit positions in one pass, but does not introduce peak shift. For a one-pass test this is a good choice, but more passes provide better comprehensiveness.

The 00 pattern also has uniform spacing (no peak shift), but you will notice that it is not in phase with the locations produced by an FF pattern. The 00 pattern essentially tests another whole set of flux reversal locations.

By using all five patterns, *DISKTEST*. *UTL* provides a quite comprehensive test of the media.

#### Other Causes of Errors

Data error problems can result from things other than imperfect media; here are a few other causes. The first is "adjacent track interference," meaning that the head is picking up some signal from the next track which is hindering its attempt to read the track it is on. This can be caused by wear, friction or looseness in the head positioning mechanism which prevents the head from stopping exactly in the center of the track.

An inadequate overwrite capability can also be a problem. When data is written, the head actually records the new data onto the track by forceably remagnetizing the oxide surface. If the write current is not correct, the head may not be strong enough to completely remagnetize the track, meaning that remnants of the old data could be

Pat	tern tern tern tern tern	125	0	a 1	repe	tit	ive	2 1	dex	DB 6D 86 99 FF	B	sen		to: : : :	disk	0	a	re	peat	ing	3		yte "	S	-	ence	= = =	6D 86 00	B6 DB ØØ	DB 6D 00	etc. etc. etc. etc.
(0)	Dat	DAT a Bi	t	Seq	uenc	e i	1 *		1 *>	D a		1 (*	1	1 *>	ø B	1 (*	1 *	1	0	1 (*	6	1 *>	0	ŀ	1	1 *>	D	0	1 (*	e	tc.
(1)	Dat	DAT a Bi	t	Seq	uenc	e i	0		1 (*	6 1	>	0	1	1 *	1 *>	0	1	1	1 *>	ø	В	1 (*	1 *	1	0	1 (*	6	1 *>	0	e	tc.
(2)	Dat	DAT a Bi	t	Seq	uenc	e i	1 *		0	B 1		1 *>	1		1 6			1	1 (*	1 *>	D	0	1 (*	1	1 *>	0	B (	1	1 *>	l e	tc.
(5)	Dat	DAT a Bi	t	Seq	uenc	e I	0	*	0	0 0	*	0	*	0 ,	0 *	0	*	1 +	0 +	0	ø *	0	* 0	11 *	0	* 0	0	ø *	0	e	
(B)	Dat	DAT a Bi	t	Seq	uenc	e i	1 *		1	F 1		1	1	1	1 1 *	1 *	1 *	1	1 *	1 *	F	1 *	1 *	I I	1 *	1 *	F	1 *	1 *	e	tc.

interfering with the new data when you try to read it.

Believe it or not, you could have media which is "too hot" for your drive. Your drive may be able to write these diskettes but not fully overwrite them.

The purpose of this discussion is to show that to test the media (and drive), you need to give it a sequence of writes, reads and seeks that will attempt to induce errors from the causes mentioned above; your actual operating modes will respect no orderly sequence of reads and writes.

#### Test Sequences

Figure 4 shows the sequence of writes and reads used in *DISKTEST*. It shows that each write is done in two passes, first by writing even tracks (or odd) while stepping in one direction and then by writing the odd (or even) tracks while stepping in the opposite direction. This is done to induce problems that would result from positioning errors. Not only that, but the pattern being written on

alternate tracks is different to induce problems from adjacent track interference.

Reads are also done in two passes following the odd/even scenario, except we always approach a track when reading from the opposite direction that we approached it when it was written. If this isn't fiendish enough, the rotating worst-case pattern test overwrites each track three times, each time with a different pattern and with the head approaching the track from the opposite direction than on the prior write.

If your drive and diskette media passes this test (and thankfully most do), then you have a high confidence that both are OK. If you run into problems which are widespread (occurring at many places on the disk), then it is more than likely that something is wrong with your drive or you have the wrong type of media for your drive. Media errors are random and generally not widespread.

Needless to say, the sources for errors

mentioned above are beyond the ability of most of us to fix, so a visit to your local repair center is called for if you cannot isolate the problem to the media.

#### **Programming Techniques**

Three machine language subroutines are used in the program to perform functions which were significant bottlenecks when implemented in BASIC. They are embedded in the BASIC program (lines 290, 295 and 300) in Hex program strings (P\$). These contain the literal object code the assembler produced.

The string is defined and then a start address (X1) is sent to a subroutine (190) which pokes the string into memory. The same string name is reused on subsequent loads because this is done only once, and there is no reason to have a lot of string space tied up forever with these routines. At the end of the loads the program string is shortened by defining it to be of no length (""). Please check and recheck the entry of these strings.

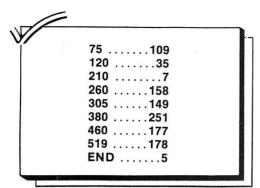
The first routine (Line 290) is too short to list, it is simply JSR [\$C000] (Call DSKCON), followed by RTS. The second, Pagefill is described in Listing 2 and is in program Line 295. It puts the write patterns in the disk I/O buffer. The third is Grantest (Listing 3), which does an operation on all nine sectors of a granule and is in Line 300. These subroutines bring the run time down from over 30 minutes to a more reasonable level.

Editor's Note: At the last minute, we discovered that the Pagefill and Grantest source code listings were inadvertently left out. They will appear in next month's RAINBOW. They do not affect running the main program.

running the main program. If you decide to study the program flow, here are a few tips. The array G(69) that stores the granule quality indicators does not always correlate with addressable logical granules. It does at the beginning, but before the test sequence the array is opened up in the middle to provide space for two pseuso-granules that the directory track occupies. At this point the array is considered to represent physical granules. Later, the array is closed up again (eliminating the directory granules), so the first 68 elements again correlate with the logical granules of the disk.

DISKTEST.UTL is offered for the personal use of readers of RAINBOW Magazine. I hope the program is useful and enhances your enjoyment of your CoCo system.

ure 4	READ, WRITE &	POSITIONING	SEQUENCES
CYCLE#	OPERATION EVE	TERN & SEEK N TRACKS (	DIRECTION DDD TRACKS
INTERLEA	VED ROTATING WOR	ST-CASE PAT	TERN TEST
1 (*)	WRITE Read track 0 READ	B6 IN only; to set OUT	6DB OUT up for next IN
2 (*)	WRITE WRITE 6 READ READ	DB OUT	BED IN
3 (*)	WRITE Read track 0 : READ	6D IN only; to set	DB6 OUT t up for next IN
INTERLEA	VED 1,0 TEST		
4 (1)	WRITE WRITE Read track 0 ( READ READ	FF IN only; to set	00 OUT up for next IN
5 (2)	WRITE WRITE READ READ	00 DUT	FF IN
£ (3)	WRITE Dire	ectory track sekeeping c	only, FF
(#) are	s DB6, 6DB, B6D, re 2. cycle numbers si *) are not done	hown in the	short test.



The listing:

10 'DISKTEST.UTL 1.1 (C) 1983 BY CHARLES C. ZIMMER 101 AUSTIN RD SUDBURY, MA Ø1776

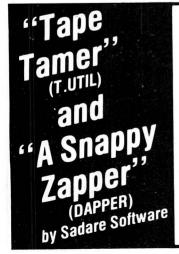
15 CLEAR9Ø 20 BC=3:CLSBC 25 GOSUB180:GOTO 280 30 'i/o sub-----35 POKEPP, 01: POKEPP+1, D1: POKEPP+ 2, T1:POKEPP+3, S1:POKEPP+4, 4:POKE PP+5.Ø:X=USRØ(Ø):EC=PEEK(PP+6):R **ETURN** 40 'gran to disp sub-----45 IFX>33THENG=X+2ELSEG=X 50 IFG(X)=&HFF THENM\$=" "ELSEM\$ =RIGHT\$(STR\$(X),2) 55 PL=69+32\*INT((G-24\*INT(G/24))  $/2) + 10 \times INT(G/24) + (G-2 \times INT(G/2)) \times$ 3 60 IFG(X)<>&HE9 THENPRINT@PL.USI NG"%%"; M\$; : RETURNELSEFORX2=ØT01: POKE&HØ4ØØ+PL+X2, ASC (MID\$ (M\$, X2+ 1,1)):NEXTX2:RETURN 65 'inkey sub----7Ø K\$=INKEY\$: IFK\$=""THEN7ØELSERE TURN 75 'pause sub----80 PRINT@I1, M1\$;:GOSUB70:GOSUB17 Ø: RETURN 85 'defect list form sub-

90 CLSBC:PRINT@3, "MAP OF DEFECTI VE GRANULES: ":: X3=0: FORX1=34T054 STEP10: PRINT@X1, "TK/GR: GR"; : FORX 2=1T012:PRINT@X1+32\*X2,USING"##" ;X3;:PRINT"/ : ";:X3=X3+1:NEXT X2, X1: PRINT@438, STRING\$(8,F\$);:P RINT@239, "(DIR)"; : RETURN 95 'list defects sub----100 GOSUB90: FORX=0TO67: IFG(X)=&H B9 ORG(X) = &H99 ORG(X) = &HE9 THENGOSUB45: NEXT: RETURNELSENEXT: RETUR 105 'declare defects sub-----110 PRINT@I3, M3\$; "DEFECT ENTRY P ";:PRINT@I1,"<C>ONTINU DINT E <E>NTER DEFECTS ";:PLAYA\$ 115 GOSUB7Ø: IFK\$="C"THENRETURNEL SEIFK = "E"THENGOSUB170:GOTO120EL SEPLAYES: GOTO115 120 PRINT@13, STRING\$ (30, 32); : PRI NT@11, "<I#>INSERT <D#>DELETE <C> ONTIN";:PLAYA\$:PRINT@I3,"";:INPU T" "; Is: PRINT@I3+30, Fs;: Ls=LEFTs (I\$,1):IFL\$="C"THEN11ØELSEIFL\$=" D"ORL\$="I"THEN125ELSEGOSUB155:GO T012Ø 125 X1=LEN(I\$)-1:FORX2=1TOX1:IFM ID\$(I\$, X2+1, 1)<"Ø"ORMID\$(I\$, X2+1 ,1)>"9"THENX2=X1:GOSUB155:NEXT:G OTO12@ELSENEXT: I=VAL(RIGHT\$(I\$,X 1)):IFI<ØORI>67THENGOSUB155:GOTO 130 IFG(I)=&HB9 ORG(I)=&HE9 THEN PRINT@13, "CANNOT OVERRIDE TESTED RESULTS";:PRINT@I1,M1\$;:PLAYE\$E LSE14Ø 135 GOSUB7Ø:GOTO12Ø 14Ø IFL\$="I"THENG(I)=&H99 ELSEG( 145 X=I:GOSUB45:GOTO12Ø

I)=&HFF

150 'invalid resp sub-----

155 PRINT@I3, "INVALID ENTRY



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TOTAL S		Marylan	d residents add 5% sa	ales tax.

#### ";:PRINT@I1,M1\$;:PLA

YE\$ 16Ø GOSUB7Ø: RETURN 165 'msg clear sub-----17Ø PRINT@I3,C\$;F\$;F\$;C\$;:RETURN 175 'logo sub-----18Ø PRINT@134,"\* D I S K TES T \*";:PRINT@224,"COPYRIGHT (C) 1 983 BY C C ZIMMER";: RETURN 185 'ml load sub-----19Ø FORX=ØTOLEN(P\$)/2-1:POKEX1+X .VAL("&H"+MID\$(P\$,1+2\*X,2)):NEXT X: RETURN 195 'print question sub-----200 PRINT@I1, "<P>FOR PRINTOUT OTHER>CONTIN"; : PLAYA\$ 2Ø5 GOSUB7Ø:IFK\$<>"P"THENP=Ø:RET URNELSEP=1:PRINT@I1, "ENTER DATE "::PRINT@I3.S <YYMMDD> TRING\$ (30, 32); :PRINT@13, ""; :PLAY As: INPUTDs:PRINT@I3+30,Fs;:RETUR N 210 'diskette # sub-----215 PRINT@I1, "ENTER DISKETTE NUM ";:PRINT@I3,STRING\$( BER <###> 30.32);:PRINT@I3,"";:PLAYA\$:INPU TDN: LN\$=LEFT\$(LN\$,8)+RIGHT\$("ØØØ

#### TEAC SANYO MPI





"+RIGHT\$(STR\$(DN), LEN(STR\$(DN))-

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1).3):GOSUB17Ø:RETURN 220 'print id sub---225 POKE149, Ø: POKE15Ø, 18: POKE155 .96:PRINT#-2,CHR\$(28);CHR\$(27);C HR\$ (48): 23Ø PRINT#-2,USING"% %d#%% % % ";RIGHT\$(LN\$,3),D1,T\$,D\$;:RETU 234 'print log sub-----235 X2=0:FORX=0T067:IFG(X)=&HB9 THENPRINT#-2, "-"; ELSEIFG(X)=&H99 THENPRINT#-2, CHR\$(34); ELSEIFG(X )=&HE9 THENPRINT#-2,"."; ELSEPRIN T#-2. USING"#"; X2; 24Ø X2=X2+1: IFX2=1ØTHENX2=Ø: PRIN T#-2, CHR\$ (27); CHR\$ (74); CHR\$ (28); CHR\$(31); CHR\$(27); "T"; : PRINT#-2, USING"#"; X/1Ø; :PRINT#-2, CHR\$(27) ;"I";CHR\$(28);CHR\$(27);CHR\$(75); : NEXTELSENEXT 245 PRINT#-2,"":RETURN 250 'drive # sub-----255 PRINT@I1, "ENTER DRIVE NUMBER ";:PRINT@I3,STRING\$( 30,32);:PRINT@I3,"";:PLAYA\$:INPU TD1:GOSUB170:RETURN 260 'test type sub----265 PRINT@I1,"<S>HORT TEST ER>FULL TEST";:PLAYA\$ 27Ø GOSUB7Ø: IFK\$="S"THENT\$="Sh": RETURNELSET #= "Lq": RETURN 275 'initialization..... . . . 28Ø I1=481:I3=449:FC=127+16\*BC:B \$=CHR\$(128):C\$=STRING\$(30,FC):F\$ =CHR\$(FC):PP=256\*PEEK(&HCØØ6)+PE EK(&HC@@7):DIMG(69):DEFUSR@=&H@E ØØ: DEFUSR1=&HØEØA: DEFUSR2=&HØE86 : B=&HØ4ØØ 285 LN\$="DEFLOG ":A\$="V31;05;L3 5; T5Ø; EP3EP3E": E\$="V31; 03; L35; T5 Ø; EP3EP3E" 29Ø P\$="AD9FCØØ439": X1=&HØEØØ:GD AE8D00236F8D00211F31A68D001B8155 27ØEEC81EDA1A684A7AØ6C8DØØØB2ØE8

295 P\$="347FBDB3ED338DØØ2D33CB1Ø A684A7A4357F39Ø4ØØØØDB6DB6DB6DØØ ØØØØFFFFFF": X1=&HØEØA: GOSUB19Ø 300 P=="343FBDB3EDBEC006A7028A09 3D4C5CE7Ø31FØ2AD9FCØØ4E6Ø6271ØE6 Ø2C11126Ø5CCØØØ22ØØECCØØØ12ØØ91F 20810926DCCC00000BDB4F4353F39": X1 =&HØE86:GOSUB19Ø:P\$="" 305 M16="<ANY> TO CONTINUE

R QUIT 310 PRINT@I1, M1\$; 315 PRINT@I3, "PLEASE TURN UP VOL

":M2\$="<ANY> TO RESTART O

UME ON TV ";:FORX=1T0150:NEXT: PLAYES: KS=INKEYS: IFKS=""THEN320E LSEGOSUB170:GOSUB255:GOSUB265:GO SUB200: GOTO350 320 PRINT@I3, "please"; B\$; "turn"; B\$; "up"; B\$; "volume"; B\$; "on"; B\$; " tv"; B\$; B\$; B\$; :FORX=1T0150:NEXT:P LAYA4: GOTO315 325 'dir error abort point.... 330 PRINT@I3, "DIR. TRACK ERROR-C AN'T CONTIN.";: IFP=1THENGOSUB225 :PRINT#-2, "DIR. TRACK ERROR-CANN OT CONTINUE-DISK NOT USABLE OR U NFORMATTED": PLAYESELSEPLAYES 335 'restart point..... 340 PRINT@I1,M2\$;:GOSUB70:CLSBC 345 'start point..... 350 GOSUB180:PRINT@I1, "<C>OMMENC E TEST <Q>UIT ";:PRINT@I3 ,"INSERT OR CHANGE DISKETTES "; :PLAYA\$ 355 GOSUB70: IFK = "C"THENGOSUB170 :GOSUB215:GOTO365ELSEIFK\$="Q"THE NGOSUB170:PRINT@13-33,"";:ENDELS EPLAYE4: GOTO355 1 360 'file check..... 365 GOSUB170:PRINT@357, "OPERATIO N: FILE CHECK ";:T1=17:S1=2:01=2

:GOSUB35:IFEC<>ØTHEN33ØELSE37Ø 370 X1=1:FORX2=ØTO67:G(X2)=PEEK( B+X2): IFG(X2)<>&HFF THENX1=Ø 375 NEXT: IFX1=1THENPRINT@13, "NO FILES ";:GOTO39Ø 380 PRINT@I3,"files present "; 385 'directory check..... 390 T1=17:S1=3:O1=2:GOSUB35:IFEC <>ØTHEN33Ø 395 'log check..... 400 LF=1:FORX2=0TO7:IFASC(MID\$(L N\$, X2+1,1))<>PEEK(B+X2)THENLF=Ø 405 NEXTX2: IFLF=1THENPRINT@13+15 ,"LOG PRESENT ";ELSEPRINT@13+ 15, "NO DEFECT LOG "; 410 PRINT@I1,"<C>ONTINUE <OTHER >ABORT TEST ";:PLAYA\$ 415 GOSUB7Ø:IFK\$="C"THENGOSUB17Ø :GOTO425ELSECLSBC:GOTO35Ø 420 'log array prep..... 425 IFLF=ØTHEN435ELSEX1=PEEK(B+1 43Ø X2=G(X1):G(X1)=&HB9:IFX2>=&H CØ AND X2<=&HC9 THEN435ELSEIFX2< =67THENX1=X2:GOTO43ØELSEPRINT@I3 "ERROR IN LOG - WILL TEST ALL ";:PLAYE\$:LF=Ø:GOSUB8Ø 435 FORX2=ØTO67: IFLF=ØTHENX1=&HF



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F:GOTO44ØELSEIFG(X2)=&HB9 THENX1 =&HB9:GOTO44ØELSEX1=&HFF 44Ø G(X2)=X1:NEXT 445 'first declare point..... 45Ø GOSUB1ØØ:M3\$="first ":GOSUB1 455 'test sequence..... 46Ø DATAØ,34,2,Ø,3,33,1,-2,1,3,Ø  $\emptyset$ , 1,  $\emptyset$ ,  $\emptyset$ , 1, 33, 2, 1, 2, 34,  $\emptyset$ , -2,  $\emptyset$ , 2,  $1,33,2,2,3,34,\emptyset,-2,1,3,\emptyset,34,2,1,$ 2,33,1,-2,2,2,0,34,2,2,3,33,1,-2  $,\emptyset,3,\emptyset,\emptyset,1,\emptyset,\emptyset,1,33,2,\emptyset,2,34,\emptyset,-$ 465 DATAØ,34,2,8,3,33,1,-2,5,3,0  $\emptyset$ , 1,  $\emptyset$ ,  $\emptyset$ , 1, 33, 2, 5, 2, 34,  $\emptyset$ , -2, 8, 2, 1,33,2,8,3,34,0,-2,5,3,0,34,2,5, 2,33,1,-2,8,2 47Ø DATA17,17,1,8,3 475 'DATAØ, 3, 1, Ø, 2 48Ø DATA99,Ø,Ø,Ø,Ø 485 CLSBC: X1=.75:RESTORE:FORX=67  $TO34STEP-1:G(X+2)=G(X):NEXT:DE=\emptyset$ :G(34) = &HFF:G(35) = &HFF49Ø IFT\$="Sh"THENFORX=1TO7Ø:READ OP: NEXTX 495 READ TI, TE, ST, PA, OP: IFDE=1TH EN565ELSEIFTI=99THENFORX=36T069:

=3THENX=USR1(PA):GOTO5ØØELSEIFOP =ØTHENO1=2:T1=TI:S1=1:GOSUB35:GO T0495 500 D1=OP:X1=X1+.25:PRINT@295." ";:PRINT@327," CYCLE: ";:PRINT@359." TRACK: ";:PRINT@391." granule: ";:PRINT@423,ST OPERATION: RING\$(18,32); 505 POKEPP, 01 510 FORT1=TI TO TE STEP ST:PRINT @3Ø7,USING"##";INT(X1);:PRINT@33 9.USING"##"; T1; : IFOP=2THENPRINT@ 403, "READ "; ELSEPRINT@403, "WRITE 515 FORX2=ØTO1:PG=2\*T1+X2 52Ø G1=2\*T1+X2: IFT1>17THENG1=G1-525 IFT1=17THENPRINT@371."DIR";E LSEPRINT@37Ø, USING"### "; G1; 53Ø IFG(PG)=&HB9 ORG(PG)=&H99 OR G(PG) = & HE9 THEN 545 535 PRINT@423,STRING\$(16,32);:X3 =256\*T1+X2:EC=USR2(X3):IFEC=ØTHE N545ELSEIFEC=2THENX2=1:T1=TE:DE= 1:GOTO54ØELSEPRINT@423." BAD GRANULE ";:PLAYE\$ 54Ø G(PG)=&HE9 545 NEXTX2: NEXTT1: GOTO495 550 'final declare point..... 555 GOSUB100:M3\$="final ":GOSUB1 10:CLSBC 560 'format allow table..... 565 IFDE=1THEN33ØELSEX=USR1(8):X 3=Ø: X2=Ø: X1=Ø 57Ø FORLG=ØTO67: IFG(LG)=&H99 ORG (LG)=&HB9 ORG(LG)=&HE9 THEN575EL SE585 575 IFX3<>ØTHEN POKEB+X1,LG ELSE X2=LG 58Ø X1=LG: X3=X3+1 585 NEXTLG: IFX3=ØTHEN59ØELSEPOKE B+X1, &HC9 59Ø T1=17:S1=2:O1=3:GOSUB35:FORX 4=1T02ØØ:NEXTX4:IFEC<>ØTHEN33Ø 595 'format dir entry...... 600 X=USR1(8):FORX=0T010:POKEB+X ,ASC(MID\$(LN\$,X+1,1)):NEXT:POKEB +11,1:POKEB+12,0:POKEB+13,X2:POK EB+14,1:POKEB+15,0:IFX3=ØTHENPOK 605 T1=17:S1=3:O1=3:GOSUB35:FORX 4=1TO2ØØ: NEXTX4: IFEC< >ØTHEN33Ø 610 GOSUB90:PRINT@13,"test cplt - FINAL DEFECT LIST ";:FORX=ØTO6 7: IFG(X)<>&HFF THENGOSUB45 615 NEXTX 620 IFP=1THENGOSUB225:GOSUB235 625 PLAYA\$: GOTO34Ø



G(X-2)=G(X):NEXT:GOTO555ELSEIFOP

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# A Simple Text Processor

#### By Ashok Basargekar

ne of my favorite hobbies is to improve the Color Computer software written by others in my favorite RAINBOW magazine, give it a personal touch and enjoy the results. I remember Mr. Lewandowski's series of articles on the simple text handling program. I used to read the articles, enhance them to my satisfaction and wait for his next installment. After waiting for several months for him to give me some hints on the *EDIT* feature of his text handling program, I decided to take on this task myself.

Before going into the *EDIT* feature, I would like to present a complete face lift that I have given to the other subroutines of the text handler.

The first six lines of my assembly lan-

guage source code define the ROM routines I will be using. The next 14 lines are the direct page addresses that I will be using to store my constants and variables. I may use a portion of the direct

"The Compose mode allows you to compose a new text, or to append a typed or loaded text from a tape or disk. Words will not wrap around to the next line while typing, but they will be properly moved to the next line at the time of printing on a paper."

page; that's what the Getting Started with Color BASIC manual says! The START of my program uses the auto key repeat feature, published by Roger Schrag in his article on "Super Patched EDTASM". At START1 I release the alpha lock so I start my text processor with lowercase letters. In WIPE, I clear all the text buffer and then branch to FIN1 for my new menu. I beg your pardon, Mr. Lewandowski, I have used my name instead of yours, in the MES1. Instead of using LINPUT routine for

text handling, I have made it characteroriented in CONT for continue. I thought that the original PAPER routine was very primitive, so I changed it to give me the top of the form, left margin, line width and line spacing selections. First I take the characters up to the line width and go back to the nearest place where I can break a word before going to the next line. The CLOAD, CSAVE, LOAD and SAVE routines are the gifts of Roger Schrag from his disk and tape I/O routines. Before I go to the LINPUT for filename, I lock the alpha lock, so that the filename is always in capital letters. The EXIT routine also does the same thing. Finally I come to my EDIT routine for some comments.

Here I have used the same memory locations that I used to store the constants of PAPER routine in the direct page. SCL is used to store the text buffer address that will equate to the top left corner of the video screen. MARGIN stores the text buffer address that equates to the bottom right corner of the video screen. These addresses are revised as soon as the Y register (cursor pointer) goes beyond \$400-\$5FF range. Before bringing the next portion of the text for editing, all the previous buffer area is revised to match the screen

(Ashok Basargekar, a civil engineer in California, has developed an interest in computer science as a hobby. He has developed some programs in civil engineering subjects on CP/M. He received his Bachelor's degree in civil engineering from Baroda University in India and further courses in civil engineering and computer languages at California State University in Long Beach, Calif., Polytechnic University, Pomona and Santa Ana College in Santa Ana, Calif.)

buffer. The COPY routine brings a copy of a portion of text in video screen for editing and the REVISE routine sends the edited text from screen to the text buffer. The NXTPGE and PRVPGE routines change the SCL and MARGIN addresses of next page or previous page depending upon the cursor movement. The DELETE routine moves all the text one to the left when the CLEAR key is pressed. The INSERT routine moves all the text one to the right for making room for a character in the middle.

I have used Spectral Associates' *ULTRA 80C* for editing and assembling this program. Of course, you may use any other assembler you wish. Since I have installed the *Lower-Kit*, by Green Mountain Micro, in my CoCo, the entire text is very beautiful on the screen.

The entire machine language code resides from \$E00 through \$16D4 and for a 32K computer, you will have plenty of text buffer area from \$16D5 through \$7FFF. The program is completely position independent except the address table for the menu subroutines. The control keys and procedure in using my Text Processor are as follows:

#### Initialization

LOADM"TEXT PRO" and EXEC will access this program. You will get a complete menu of selection as follows:

1) COMPOSE

The Compose mode allows you to compose a new text, or to append a typed or loaded text from a tape or disk. Words will not wrap around to the next line while typing, but they will be properly moved to the next line at the time of printing on a paper. Any immediate mistakes can be corrected by moving the cursor backward, with the left arrow key. Once you exit this Composing mode, and return back for continuing the text, you will not be able to correct the previously typed text with the left arrow key. You will need to go to the Edit mode for this purpose. While composing the text, do not press the ENTER key unless you want to go to the next line for a new paragraph. Pressing ENTER will provide a hard carriage return when printing the text on a printer. To exit the Composing mode, simply hit the BREAK key. You will return back to the main menu of selections.

#### 2) EDIT

The text in the Edit mode appears slightly different from that in the Composing mode. You will see a red block at the places you have pressed the ENTER key, for providing a hard carriage return for a new paragraph. The up, down,

right and left arrow keys will move the cursor anywhere in the text, while in the Edit mode. The CLEAR key will delete one character at a time. The SHIFT-CLEAR keys will allow you to insert any text in the middle. The flashing cursor will disappear when you are in the Insert mode. You will return back to the Edit mode by pressing the BREAK key. You will exit the Edit mode by pressing the BREAK key again. The text can also be appended at the end while you are in the Insert mode. To revise the text in the Edit mode, simply write new text over the existing text.

"...Simply enter the desired printing specifications for total line width, left margin and line spacing. Your text will be printed on the paper according to your specifications."

#### 3) CLOAD

This selection will allow you to load a text from a cassette tape. The text can be loaded at the end of any typed or other-loaded text, allowing you to merge two or more texts.

#### 4) DLOAD

This selection will allow you to load any text from a disk. You will be asked to enter a filename. The filename must be the entire name including the extension. If the filename is not found, or if the file is on a bad disk, you will receive an error message number. If so, simply press any key to go back to the main menu. Refer to Table 1 for the type of error.

#### 5) PRINT

The underlining codes are presently set for the Brother Correctronic 50 typewriter. The Baud rate is set at 1200. Simply enter the desired printing specifications for total line width, left margin and line spacing. Your text will be printed on the paper according to your specifications. The paper will advance to the new page after printing 60 lines. Therefore, adjust the paper so that three blank lines are left at the top. This will provide three blank lines at the bottom. To change the printer Baud rate and printable lines per page or to change the underlining codes, you will need the following corrections to the software before executing the program.

POKE & HF74, msb: POKE & HF75, lsb of Baud rate constants.

POKE &H100D, n where n = printable lines per page.

POKE &H1016, m where m = blank lines at top and bottom of page.

POKE & H102C, 27: POKE & H1031, 45 for start of underlining codes for Brother.

POKE & H1037, 27: POKE & H103C, 82 for end of underlining codes for Brother.

POKE & H102C, 32: POKE & H1031, 15 for start of underlining codes of LP VIII

POKE &H1037, 14: POKE &H103C, 32 for end of underlining codes of LP VIII

#### 6) CSAVE

This routine will allow you to save the text on a cassette tape.

#### 7) DSAVE

This subroutine will allow you to save the text on a disk. You will be asked for a filename. It must be up to eight characters in length with an extension up to three characters. If an extension is not specified, none will be assumed. Therefore, give a filename like: TEXT/DAT or TEXT.TXT, etc.

The codes for the error messages while reading or writing text from or to the disk are as follows:

#### TABLE 1

#### CODE TYPE OF ERROR

- 19 File already open
- 20 Bad device or drive number
- 21 I/O error
- FM error
- File not open
- 24 Input past end of line
- File not found
- 29 Disk full
- 30 Out of buffer space
- 31 Disk write protected
- 32 Bad filename
- 33 Bad file structure
- 37 Verification error

#### 8) EXIT

This will exit to BASIC. You will lose all the text with this selection. Therefore, make sure that the text is saved on the tape or disk prior to selecting EXIT.

Happy text processing! If you have any questions or suggestions regarding my text processor please drop a line with a SASE to Ashok Basargekar, 1423 North Cleveland Street, Orange, CA 92667, (714) 639-3996.

#### The listing:

The noting	••	BEBC 28	2 66388	BRA STARTI
	88818 **********************	DEDE BO	1982 66398 NMI	LDA \$982
	88828 * A SIMPLE TEXT PROCESSOR +	ØE11 27 5	C 98498	BEQ REPOUT
	00030 * BY ASHOK BASARGEKAR. +	BE13 BE	983 66416	LDX \$983
	88848 * 1423 NORTH CLEVELAND STREET. *	ØE16 AF 6	A 88428	STX SEA.S
	00050 + DRANGE, CA. 92667. +	8E18 7F 6	982 88438	CLR \$982
	88868 *********************************	BEIB 3B	88448	RTI
	00061 +	ØE1C B6 F	F83 88458 IRQ	LDA SFF83
	88878 ★ MAJOR ROM ROUTINES USED BY THIS PROGRAM.	8E1F 2A 4	E 88468	BPL REPOUT
	00071 +	ØE21 86 F	F82 88478	LDA SFF#2
A928	8888 CLS EQU \$A928 Clear screen.	€24 Bb €	985 00480	LDA \$985
A3#A	00090 SCREEN EQU \$A30A Print on screen.	ØE27 27 1	8 88498	BEG REPEAT
A393	88188 LINPUT EDU \$A393 Line input.	ØE29 7A Ø	985 00500	DEC \$985
A2BF	00110 PRNTR EQU \$A28F Print on printer.	ØE2C 26 Ø	8 99519	BNE REPEAT
AICI	88128 INKYS EDU \$A1C1 INKEY\$	ØE2E B6  ₿	986 00520	LDA \$986
A#27	00130 QUIT EQU \$A027 Back to Basic.	ØE31 84 B	8 88538	ANDA #\$BØ
A7D3	00140 DELAY EQU \$A7D3 Delay until X=0		986 99549	STA \$986
	88141 +		40 00550	STA \$FF48
	68142 + Constants & variables stored in Direct Page.	ØE39 8E Ø	52 00560 REPEAT	LDX #\$152
	88143 +	ØE3C A6 8		LDA ,X+
8888	88158 KCLEAR EBU 18 Auto key repeat	ØE3E 81 FI		CMPA #\$FF
8681	00160 KHOLD EQU \$1 constants.	BE48 26 1		BNE RP2
6682	88178 BUFST EQU 12 Start of text buffer addtess.		5A 66666	CMPX #\$15A
8884	00180 BUFEN EQU \$4 End of text buffer address.	6E45 26 F		BNE RP1
8886	88198 SCL EQU \$6 Start of current line.	BE47 BC BE		INC (KCLEAR
8888	00200 MARGIN EQU \$8 Left margin.	BE49 96 BI		LDA (KCLEAR
8889 888A	00210 LN EQU 99 Line midth.	ØE4B 81 Ø8		CMPA #\$6
	00220 CLW EQU \$0A Current line width.	ØE4D 26 26		BNE REPOUT
666B	##23# SPACE EQU ##B Line spacing.	9E4F 8F 86	5 TOTO	CLR (KCLEAR
888C 888D	00240 LCP EQU SOC Line counter of page.	6E51 0F 0	0.07.00.00	CLR <khold< td=""></khold<>
988E	00250 LENGTH EQU \$00 Length of filename. 00260 DSAVE EQU \$0E Tape/disk error vector.	ØE53 20 16	538 7 5 E. C.	BRA REPOUT
8811	00260 DSAVE EQU \$0E Tape/disk error vector. 00270 STACK EQU \$11 Tape/disk stack pointer.	ØE55 ØC Ø:		INC (KHOLD
0811	88288 +	ØE57 96 Ø1		LDA <khold< td=""></khold<>
8E88	88298 ORG \$L30	ØE59 81 18 ØE5B 26 12		CMPA #\$1E
DEBD	86360 +	8E5D 88 83		BNE REPOUT
	84318 + Following interrupt service routine is similar to one	ØE5F 97 Ø1		SUBA #\$3 STA (KHOLD
	#832# + in Rainbow Sept 83, page 77		52 88758	LDX #\$152
	66336 +	9E64 A6 84		LDA X
0E00 30 80 0B	88348 START LEAX (NMI.PCR	8E66 8A 3F		ORA ##3F
8E83 BF 818A	88358 STX \$18A	ØE68 A7 86		STA .X+
8E86 38 8C 13	##36# LEAX ∢IRQ,PCR		5A 88798	CMPX #\$15A
8E89 BF 818D	88378 STX \$16D	#E6D 26 F5		BNE RP3
	CEDALC CONTROL		22300	DITE III O

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#### RECESS GAMES



Games in one program provide an enjoyable format for using higher level thinking skills. Players must reason logically while playing Treasure Hunt, Masterbrain, Tic Tac Toe, and Number Guess. Children use co-ordinates and a hot/ cold thermometer to find a treasure hidden behind a grid. Number Guess includes an optional use of a number line to help children approximate answers. In Master-

A superb Christmas gift! Four brain, players must consider the many possible ways to arrange specific digits to build numbers. Tic Tac Toe encourages children to predict and plan sequential moves. All games are multi-leveled so children of different ages can play the same game. One and two player options — Large graphic numerals Attractive Screen Displays.

> Grades 2-8 16K Cass.(2) - \$19.95 32K Disk - \$21.95

#### SPELLING

Add zest to the basics! Spelling allows you to input your own words and save them on data files (tape or disk). You may also purchase ready made data files (below). During the lesson a word flashes on the screen, and the student then types the word. If the word is misspelled, the correct spelling appears and aligns itself under-

neath the misspelling. The student can quickly determine the error and correct it. The score is given continuously, and all misspelled words are given at the end. A graphic display of superlative words and song provide a reward. Printer use is optional. **Spelling** will accept words with apostrophes, hyphens, and spaces. Word lists may be easily edited. \*

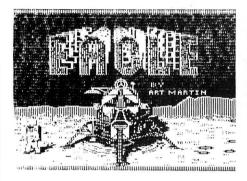
Grades 2-8. 16K Cass. - \$19.95 32K Disk - \$21.95

**Data Files** Dolch Words Most Misspelled Space Words Grades 2, 3, 4, 5, or 6 \$8.95 each - Cass. \$10.95 each - Disk

# Holiday Greetings 40th



# New From Saguaro Software!



A graphic-enhanced lunar lander simulator. The pilot breaks out of lunar orbit and attempts a soft landing on the lunar surface. Joysticks control thrust and craft altitude and information is continually displayed on horizontal and vertical velocities, acceleration values, vertical and horizontal distances from target, fuel consumption and much more. On advanced levels, problems such as fuel leaks and computer screen failures can provide hair-raising final approaches. Disk version allows choice of landing site between Mars and Earth's moon. Takeoffs from the surface can be made and the upper stage placed back in orbit. The simulation is as educational as it is fun and exciting. A areat tool for that future astronaut or physicist. 32K, 2 joysticks required. Available in tape or an enhanced disk version.

Tape - \$24.95

Disk or Amdek - \$29.95

#### **SKETCHPAD**

Sketchpad is a graphics drawing program designed to provide the computer hobbyist with easy manipulation of the powerful graphics capabilities of the Coco. Advanced programmers can design graphics screens and characters for Basic and ML programs and games. Sketchpad was used to create the graphics for "Eagle."

Two joysticks control cursors that provide endpoints and boundaries for lines, boxes, circles, ellipses and painting. Pointto-point drawstrings may be plotted on the screen and then rotated, enlarged or shrunk, moved or inverted. Patterns may be programmed in easily to create dazzling illusions using lines, boxes, circles, ellipses and drawstrings. Sketchpad supports all PMODES and color sets and gives false colors in Pmodes 1 and 4. Text and graphics can be combined on high-resolution screens. Animation is possible with up to 12 pages allowed in low-resolution and 3 full screens in high resolution. All pictures and drawstrings can be saved to disk for future use. 32K, 2 joysticks required. Disk only.

Disk or Amdek - \$29.95

The Diaestive System

An educational quiz game for 2 players covering different areas of the human digestive system. Each question is assigned a point value relative to its difficulty. A fun way to learn about a serious subject.

> The Circulatory System

Using the same format as "The Digestive System," this program covers the heart, lungs, veins, arteries, blood, etc.

**BOTH ONLY:** 

Tape - \$19.95

Disk or Amdek - \$24.95

#### **GAMES**

#### **OTHXO**

Othello® machine language game for the 16K Co-Co. 2 modes of play - you against a friend or you against the computer. When playing the computer, it will play hard or easy. In either, you had better think hard! Object of the game is to change the opponent's spots to yours by placing your marker at the end of a row started by your marker. Not as easy as it sounds! Tape, \$24.95. Disk or Amdek, \$29.95

#### Co-Co Keno

Bring Las Vegas' Keno game home with Co-Co Keno. Bet \$1, \$3 or \$5 & mark off 1 to 15 spots...can you beat the odds & win \$50,000? 16K, high resolution screen. Keno chart print included. Tape - \$24.95. Disk <u>or Amdek - \$29.95.</u>

Ultimate Bingo
The ultimate in Bingo! Use your LP 7 or 8 to print the number of cards you desire. Choose from 3 speeds of play & even pause the game to check winner's

#### Jackpot

Pull the one-arm bandit's arm - see if you can beat

#### **Both Only**

Tape - \$19.95 Disk or Amdek - \$24.95

#### Confusion

3 modes of play: 3-4, 5-6 or 7 letter words. You select time (30 or 60 seconds) to govern how long you get to unscramble the words. First person with ten correct wins! Tape - \$19.95. Disk or Amdek -

#### **EDUCATION**

#### Kidstuff

Picture, Letter, or Number Association. Play an old-time tune with correct answer (7 songs), buzzes when wrong & waits for correct choice, 8 screens. Tape - \$19.95. Disk - \$24.95.

#### Stars Of America

Education should be fun - this program is just that! This tutorial uses 25 of the superstars of American history, from George Washington to Ronald Reagan.

#### The Civil War

A challenging two-person game. Questions cover Carpetbaggers to the Battle of Vicksburg. Points are assigned according to the difficulty of the question, scores are displayed throughout the game.

Both Only: Tape \$19.95 Disk \$24.95

#### History From 1863 To 1976

On two 16K non-extended tapes. For 1-4 people. Informative & fun way to learn important dates in world history. Written for students by a teacher. Tape - \$19.95. Disk or Amdek - \$24.95.

#### MISCELLANEOUS

Co-Co Receivables Move-It! Co-Co 1 Only

29.95 15.95

#### **ADVENTURES**

#### **Treasure Hunt**

A graphics text adventure. You walk with our graphics character through desert, mountains and city to seek the illusive treasure of gold. Super graphics with a person who walks with you at each turn. Disk & Amdek only - \$29.95

This year is 4001 A.D. You are a cargo trucker deliverying a load in the Dorlian star system. Your mission is to get back to your home planet of Irat, alive. Can you survive the journey? Tape - \$24.95. Disk or Amdek - \$29.95.

#### **Loveless Manor**

Trapped in a bedroom by your evil aunt, you've admired Queen Cinderella's castle in the distance...and you've just discovered she's a distant cousin. Can you escape to her protection? 32K. Great word adventure. Tape - \$19.95. Disk or Amdek - \$24.95

#### Raid On Boordanovka

Your mission, should you decide to accept it, is to steal Russia's newest weapon and save the world. Text adventure with 50 rooms. Tape - \$24.95. Disk or Amdek - \$29.95.

Search For The Llangth
After years of study & searching, you have at last traced the alien race of Llangth to this valley. Now your quest for the power of Llangth begins! Tape-\$24.95. Disk or Amdek - \$29.95.

# Saguaro Software

# 

# Discount Software

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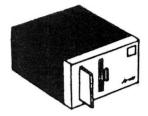
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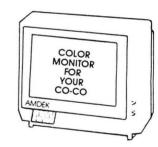


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```
BEAF 3B
                                                                                                     8EE5 26
                                                                                                               F8
                                                                                                                         61688
                                                                                                                                       BNE J7
                    ##81# REPOUT RTI
                                                                                                     GEF7 39
                                                                                                                         81618 JB
                                                                                                                                       RTS
                                                                                                                         41474 +
                    66836 * Entry to the main program with alpha lock released and
                                                                                                                         $1638 + Main menu selection routine.
                    88848 + all text buffer cleared.
                                                                                                                         81648 +
8E78 7F
          811A
                    88868 STARTI CLR $11A
                                                                                                     ØEF8 BD
                                                                                                               A928
                                                                                                                         81658 FINI
                                                                                                                                       JSR CLS
ØE73 31
          80 9857
                    88878
                                  LEAY BUFF. PCR
                                                                                                     BEFB 38
                                                                                                               8D 867E 81668
                                                                                                                                       LEAY MEST PER
8E77 189F 82
                    ##88#
                                   STY (BUFST
                                                                                                     #EFF 8D
                                                                                                               87
                                                                                                                         6167€
                                                                                                                                       BSR PRINT
8E7A 189F 84
                                                                                                     eFe1 BD
                                                                                                               ALCI
                                                                                                                         61686 WALT
                                                                                                                                       ISR INKYS
                                  STY (BUFEN
8E7D 86 88
                    88988
                                                                                                     GFA4 27
                                                                                                               FR
                                                                                                                         91498
                                                                                                                                       BED WALT
                                  LDA ##
                                                                                                     8F86 88
                                                                                                               31
                                                                                                                         81788
                                                                                                                                        SURA SETI
ØE7F A7
                    88918 WIPE
                                  STA .Y+
                                                                                                     ØFØ8 25
                                                                                                               F7
                                                                                                                         81718
                                                                                                                                       BLO WAIT
6E81 189C 25
                    98928
                                   CMPY ($25 Top of RAM reached?
                                                                                                     BEBA BI
                                                                                                               88
                                                                                                                         81728
                                                                                                                                        CHPA 858
                                  BNE WIPE
#E84 26 F9
                    88938
                                                                                                     SFSC 24
                                                                                                               F3
                                                                                                                         81738
                                                                                                                                       TIAM PHR
ØE86 20
                    98948
                                   BRA FINI
                                                                                                     BFBE 48
                                                                                                                         81748
                                                                                                                                        ASLA
                    44954 +
                                                                                                     øFØF 8E
                                                                                                               ØF19
                                                                                                                         81758
                                                                                                                                       LDX SHENU
                    #896# * Print on screen routine.
                    88978 * Printing continues until a zero byte is reached.
                                                                                                     ØF12 AE
                                                                                                               86
                                                                                                                         81769
                                                                                                                                        LDX A.X
                    66986 ×
                                                                                                                         81778 +
                                                                                                                                 I now points to the absolute address of jump
                                                                                                     ØF14 BF
ØE88 AA
          86
                    88998 PRINT LDA , X+
                                                                                                               ØF 2A
                                                                                                                         #178#
                                                                                                                                       STX BRANCH
                                                                                                     ØF17 20
                                                                                                                         81798
                                                                                                                                       RRA JUMP
ØE8A 27
          #5
                    61868
                                   BER DONE
                                                                                                               10
                                                                                                                         41864 +
BERC BD
          A38A
                                   JSR SCREEN
                    91618
                                                                                                                         #181# + Table of address of different routines.
9E8F 26
                    61926
                                   BRA PRINT
                                                                                                                         81828 +
BE91 39
                    81838 DONE
                                                                                                               ØF2C
                                                                                                                         81838 MENU
                                                                                                                                       FDB REST
                    81848 +
                                                                                                     ØF19
                                                                                                                                       FOR EDIT
                    61858 * Routine to continue with the text one character at a time
                                                                                                                136D
                                                                                                                         01840
                                                                                                                         01850
                                                                                                                                       FDB CLOAD
                    $1868 * at the end of previous text.
                                                                                                                184F
                                                                                                                                        FDB LOAD
                    61878 +
                                                                                                     ØFIF
                                                                                                               1180
                                                                                                                         01860
8E92 189E 84
                    61686 CONT
                                  LDY (BUFEN
                                                                                                     ØF21
                                                                                                               6F3B
                                                                                                                         01876
                                                                                                                                       FDB PAPER
ØE95 34 20
                    91898
                                                                                                     8F23
                                                                                                                         01880
                                                                                                                                       FDB SAVE
                    81188 #
                                                                                                     4F25
                                                                                                               1173
                                                                                                                         61896
                                                                                                                                       FOR SAVE
                    01110 * Make sure that the flashing cursor does not go below
                                                                                                                                       FDB EXIT
                                                                                                     ØF27
                                                                                                               116E
                                                                                                                         81988
                    81111 + $488 the top left corner of video screen.
                                                                                                                                       FCB $7E
                                                                                                                         01918 JUNP
                                                                                                     BF29
                                                                                                               7E
                                                                                                                         61926 BRANCH FDB 6
                                                                                                     ØF2A
                                                                                                               6966
ØE97 9E
                    81148 FLASH
                                  LDX ($88
                                                                                                                         01930 #
                                   CHPX #18486
                                                                                                                         61948 . This routine prints all the text until end and goes
ØE99 BC
          8499
                    61156
                                   BHS J1
6E9C 24
                    61168
                                                                                                                         $1958 . for continuation.
                                   INC ($89
SEPE OC
                    81176
                                                                                                                         61968 +
                                   BRA FLASH
                                                                                                     ØF2C BD
8EA8 28
                    #118#
                                                                                                               A928
                                                                                                                         #197# REST
                                                                                                                                       JSR CLS
                    61181
                                                                                                     #F2F 9E
                                                                                                               62
                                                                                                                         61986
                                                                                                                                       LDX (BUEST
                    61182 * Alternately place a black ($80) and green ($8F) cursor
                                                                                                     BF31 17
                                                                                                               FF54
                                                                                                                         91998
                                                                                                                                       LBSR PRINT
                    #1183 * until a key is pressed.
                                                                                                     ØF34 3Ø
                                                                                                                         82888
                                                                                                                                       LEAX -1,X
                                                                                                     6F36 9F
                    Ø1184 *
                                                                                                                         92010
                                                                                                                                       STY (RIJEEN
                                                                                                     #F38 16
                    Ø119Ø J1
                                   LDA #$80 Get a black cursor.
#EA2 86
          88
                                                                                                                         02020
                                                                                                                                       LBRA CONT
                                   BSR KBSCAN
          45
                    81288
SEA4 8D
                                                                                                                         02030 +
                                   BNE J2 Go to J2 if key pressed.
                    81218
ØEA6 26
          86
                                                                                                                         82848 * This routine gets the user specifications for printing
                                   LDA ##8F Wipe cursor with green.
BEA8 86
          86
                    61228
                                                                                                                         02050 + on printer and stores in the direct page.
                                   BSR KBSCAN
BEAA BD
          3F
                    Ø1238
                                                                                                                         82868 * The location SCL is used for temporary storage of each
ØEAC 27
                    61246
                                   BEQ FLASH Zero means no key pressed.
                                                                                                                         02070 € user input.
                    61241 #
                                                                                                                         #2#8# +
                    $1242 * Place a character on screen until BREAK is presed.
                                                                                                     ØF3B BD
                                                                                                               A928
                                                                                                                         82898 PAPER
                                                                                                                                       JSR CIS
                    #1243 +
                                                                                                     ØF3E ØF
                                                                                                               ØC
                                                                                                                         82188
                                                                                                                                       CLR (LCP
BEAE 81
                    61250 J2
                                  CMPA 4163 BREAKT
                                                                                                     8F48 38
                                                                                                               8D 8788
                                                                                                                         82118
                                                                                                                                       LEAX MES4. PCR
                                   BNE J3
ØEBØ 26
                    #126#
                                                                                                     9F44 17
                                                                                                               FF41
                                                                                                                         82128
                                                                                                                                       IRSR PRINT
                    81276
                                  LDA ..
ØEB2 86
                                                                                                     8F47 8D
                                                                                                               31
                                                                                                                         82138
                                                                                                                                       BSR SPECS
                                   PULS Y
ØEB4 35
                    #128#
                                                                                                     9F49 96
                                                                                                               86
                                                                                                                         82148
                                                                                                                                       LDA (SCI
BEB6 A7
          44
                    #129#
                                  STA .Y
                                                                                                     6F4B 97
                                                                                                               89
                                                                                                                         82158
                                                                                                                                        STA (I W
ØEBB 189F 84
                    61366
                                   STY (BUFEN
                                                                                                     #F4D 17
                                                                                                               FF38
                                                                                                                         92149
                                                                                                                                       I RCR PRINT
ØEBB 2€ 3B
                    #131#
                                  BRA FINI Go to main menu routine.
                                                                                                     ØF5Ø 8D
                                                                                                               28
                                                                                                                         92179
                                                                                                                                        BSR SPECS
                    01311 * If Back Space key is pressed, J4 makes it sure that
61312 * Y reg. is >=BUFEN of previously typed or loaded text.
                                                                                                     ØF52 96
                                                                                                               86
                                                                                                                         82188
                                                                                                                                       LDA (SCL
                                                                                                     ØF54 97
                                                                                                               #8
                                                                                                                         #219#
                                                                                                                                        STA (MARGIN
                    81313 + J5 revises the text buffer address pointer and echoes
                                                                                                     ØF56 96
                                                                                                               89
                                                                                                                         82288
                                                                                                                                       LDA (LW
                    #1314 * back space to screen. J6 ignores CLEAR key.
                                                                                                     ØF58 9Ø
                                                                                                               88
                                                                                                                         82214
                                                                                                                                        SUBA (NARGIN
BEBD 81
                    01320 J3
                                  CMPA #$8
                                                                                                     9F5A 97
                                                                                                               89
                                                                                                                         82228
                                                                                                                                       STA CIN
ØEBF 26
                                  BNE 36
                                                                                                     ØF5C 17
                                                                                                               FF 29
                                                                                                                         82236
                                                                                                                                        IRSR PRINT
ØEC1 86
          8F
                    61346
                                  LDA SSRE
                                                                                                     ØF5F 8D
                                                                                                               19
                                                                                                                         62246
                                                                                                                                       BSR SPECS
SEC3 A7
          9F 8888 81358
                                  STA [$88]
                                                                                                     8F61 96
                                                                                                               86
                                                                                                                         82258
                                                                                                                                        LDA (SCI
ØEC7 35
          26
                    81368
                                  PULS Y
                                                                                                     #F63 97
                                                                                                               ØB
                                                                                                                         62266
                                                                                                                                       STA (SPACE
ØEC9 31-
          3F
                    81378
                                  LEAY -1,Y
                                                                                                     8F65 17
                                                                                                               FF2#
                                                                                                                         42274
                                                                                                                                        IRSR PRINT
BECB 1890 84
                    81386 J4
                                   CMPY (BUFEN
                                                                                                     9F68 BD
                                                                                                               A1C1
                                                                                                                         62286 11
                                                                                                                                        JSR INKYS
BECE 24
          84
                    01390
                                  BHS J5
                                                                                                     AFAR RI
                                                                                                                43
                                                                                                                         #229#
                                                                                                                                        CHPA 4563
BED# 31
                    81488
          21
                                   LEAY 1.
                                                                                                     #F6D 27
                                                                                                               89
                                                                                                                         82388
                                                                                                                                        RED FINE
ØED2 28
                    61418
                                  BRA J4
                                                                                                     BEAF BI
                                                                                                                4D
                                                                                                                         92314
                                                                                                                                        CMPA #58D
                    81428 J5
9ED4 86
          .
                                   LDA ...
                                                                                                     @F71 26
                                                                                                                         92329
                                                                                                               F5
                                                                                                                                        RNF 11
₩ED6 A7
                    81438
                                   STA , Y
          A4
                                                                                                                                       LDX 468829 Baud Rate = 1288
                                                                                                     ØF73 8E
                                                                                                               8829
                                                                                                                         62336
BED8 34
          20
                    81448
                                   PSHS Y
                                                                                                     9F76 9F
                                                                                                                                       STY ($95
                                                                                                                95
                                                                                                                         82348
₽EDA 86
                    81458
                                   LDA #$8
                                                                                                     8F78 26
                                                                                                               33
                                                                                                                         82358
                                                                                                                                        BRA GO
BEDC BD
          A38A
                    81468 J6
                                   JSR SCREEN
                                                                                                                         62366 F
#EDF 81
          90
                    81478
                                   CMPA #5#C
                                                                                                                         $2378 * This subroutine oets the user input of specifications.
ØEE1 23
          84
                    91489
                                   BLS FLASH
                                                                                                                         #238# + converts from decimal to Hex number and returns in SCL
ØEE3 35
          28
                    81498
                                   PULS Y
                                                                                                                         82398 +
BEE5 A7
          AB
                    81588
                                   STA ,Y+
                                                                                                                                       CLR (SCL
                                                                                                     BETA BE
                                                                                                                         62466 SPECS
GEF7 34
          28
                    61516
                                   PSHS Y
                                                                                                     ØF7C 86
                                                                                                                86
                                                                                                                         82418 LB
                                                                                                                                       LDA 1588
8EE9 28
          AC
                    81528
                                   BRA FLASH
                                                                                                     8F7E 17
                                                                                                                FF6A
                                                                                                                         82428
                                                                                                                                        LBSR KBSCAN
                    #153# ·
                                                                                                                         82438
                                                                                                     #F81 26
                                                                                                                67
                                                                                                                                        BNE L2
                    $1540 . This routine scans key board for a press. Returns zero
                                                                                                     #F83 86
                                                                                                                8F
                                                                                                                         82448
                                                                                                                                        LDA #$8F
                    81558 + if none pressed.
                                                                                                     9F85 17
                                                                                                               FF63
                                                                                                                         82458
                                                                                                                                        LBSR KBSCAN
                    61551 +
                                                                                                     8F88 27
                                                                                                                F2
                                                                                                                         82468
                                                                                                                                        BEQ LO
BEEB AT
           9F ##88
                    81568 KBSCAN STA [$88]
                                                                                                     9F8A 81
                                                                                                                6D
                                                                                                                         82478 L2
                                                                                                                                        CMPA 4580
                    #157# J7
                                   JSR INKYS
BEEF BD
          AICI
                                                                                                                                        BNE L3
                                                                                                     ØF8C 26
                                                                                                                         82488
                    61586
                                   BNE J8
 BEF2 26
           #3
                                                                                                     #F8E 39
                                                                                                                         82498
                                                                                                                                       RTS
                    81598
                                   DECB
```



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OKIDA	TA 82 (SER.) W/COCO CABLE\$32	9.00
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T &	D	INCL	UDED	

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NOTE: AL	L SALES	FINAL.	NO	RETUR
	1			

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				_
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				•	_
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_				
	ØF8F 81	30	02500 L3	CMPA #\$36
	ØF91 25	E9	02510 02510	BLO LØ
	6F93 81	39	62526	CMPA \$\$39
	ØF95 22	E5	02530	BHI LØ
	ØF97 BD	A38A	02540	JSR SCREEN
	8F9A 88	38	#255#	SUBA #\$30
	BF9C BD	86	#256#	TST (SCL
	9F9E 26	84	#257#	BNE L4
	8FA8 97	96	82588 L6	STA (SCL
	#FA2 2#	D8	#259#	BRA LØ
	BFA4 C6	ØA	82688 L4	LDB #\$ØA
	#FA6 9B	86	82618 L5	ADDA (SCL
	#FAB 5A		82628	DECB
	#FA9 26	FB	<b>0</b> 263 <b>0</b>	BNE L5
	ØFAB 20	F3	82648	ERA L6
			82658 +	
			#266# * This	s is the main entry for printing text on printer.
			82678 +	
	#FAD 9E	#2	<b>82788</b> 60	LDX (BUFST
			82781 +	
			02702 + Star	rt address of current line to be printed is stored
			82763 + at 5	SCL, no. of characters that can be printed within
				ected line width and margin is determined and is
			82785 + stor	
			#2786 +	
	ØFAF 9F	96	82718 LP99	STX (SCL
	#FB1 5F		62728	CLRB
	ØFB2 A6	8#	#273# LP1	LDA ,X+
	ØFB4 27	28	82746	BE9 STORE
	BF B6 81	<b>8</b> D	62756	CMPA #\$#D CR?
	ØFB8 27	24	€276€	BEQ STORE
	ØFBA 5C		82778	INCB
	ØFBB D1	89	82783	CMPB (LW
	ØFBD 26	F3	82798	BNE LP1
	ØFBF 3Ø	1F	92899	LEAX -1,X
	ØFC1 81	28	#281# LP2	CMPA #\$28 SPACE?
		19	<b>62826</b>	BEQ STORE
	#FC3 27	• •		
	ØFC3 27 ØFC5 81	2E	Ø283Ø	CMPA #\$2E PERIOD?
		17/3/	92839 92849	CMPA #\$2E PERIOD? BEO STORE
	ØFC5 81	2E		
	ØFC5 81 ØFC7 27	2E 15	Ø284Ø	BEQ STORE
	ØFC5 81 ØFC7 27 ØFC9 81	2E 15 21	02840 02850	BEQ STORE CMPA #\$21

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ØFD1	81	2D	#289#		CMPA #\$2D	
#FD3		89	82988		BEQ STORE	
ØFD5		3F	82918		CMPA ##3F	
ØFD7 ØFD9		Ø5 82	#292# #293#		BEQ STORE	
#FDB		02	82948		LDA ,-X DECB	
#FDC	20	E3	#295#		BRA LP2	1 9-1
<b>#FDE</b>	D7	ØA	#296#	STORE	STB (CLW	
			82978			
			#298# #200#	* Main	outine for pr	inting a line on printer.
9FE#	C4	FE	62996 63666	*	LDB #\$FE Devi	4.2
ØFE2		6F	83818		STB (\$6F	Ce 1-7
ØFE4	9E	96	#3#2#		LDX (SCL	
			#3#21	+ Print	specified lef	t margin if any.
#FE&		#8	03030		LDB (MARGIN	
ØFE8		98 29	63646 63656		BEQ LP4	
ØFEC		A2BF	63666	1 27	JSR PRNTR	Summer that some days
<b>BFEF</b>			93976	21.5	DECB	
8FF#		FA	#3#8#		BNE LP3	
ØFF2		6A	83898		LDB (CLW	
ØFF4		88	83188	LP13	LDA ,X+	
8FF8		4B	83118 83128		CMPA #\$## BEQ LP5	
ØFFA		ØD	63136		CMPA #\$ØD	
ØFFC	26	25	83148		BNE LP6	
			03150			
						line feeds equal to spacing selected,
			63176 63186		printing each	line.
ØFFE	D6	<b>8</b> B	63196		LDB (SPACE	
1000		81	83288		BNE LP7	
1882			63216		INCB	
1983		ØD	83226	LP7	LDA #\$#D	
1985		A2BF ØC	63236 63246		JSR PRNTR INC (LCP	
188A		ØC	63256		LDA (LCP	
198C		30	#326#		CMPA #\$3C	68 LINES?
188E	27	05	63276		BEQ LP8	
1916			Ø328Ø		DECB	
1811		F <b>Ø</b> 9A	63296 63366		BNE LP7 BRA LP99	
1013	70	78	83318		DIN LITT	-
			03320	* This	outine skips	six lines after printing sixty lines
					ch page and go	es to new page.
1015	CL	86	03340 03350		LDB 46	6 BLANK LINES.
1617		ØD	93369		LDA #\$#D	o benni ernesi
1919		A2BF	03370		JSR PRNTR	
101C	5A		#338#		DECB	A STATE OF THE PARTY OF THE PAR
1010		F8	03396		BNE LPIØ	
181F 1821		9C 38	03400 03410		CLR (LCP BRA LP99	- 1
1021	20	00		# This		one character at a time on printer.
						pecial printer commands for underlining.
	200	10	03440		DUDA 4400	
1023		20	03450 03460	LP6	BEO LP11	
1925		16 3C	93479		CMPA #\$3C	(?
1029		67	83488		BNE LP12	
102B		1 B	63496		LDA #\$18	
1020		A2BF	03500		JSR PRNTR	
1930		45	03510 03520	1912	LDA #\$45 CNPA #\$3E	>?
1932		3E Ø7	93539	LT 12	BNE LPII	**
1936		1B	03540		LDA #\$1B	
1938		A2BF	#355#		JSR PRNTR	5 % 1 %
1Ø3B		52	Ø356 <b>Ø</b>		LDA #\$52	
163D	737	A2BF	83578	LPII	JSR PRNTR	
1846		B1	03580 03590		DECB BNE LP13	
1043		B9	03600		BRA LP14	
			93619			
						inal carriage return, changes device
					o screen and r	eturns to main menu.
1845	86	ØD	03640 03650		LDA ###D	- 12 10 10 10 10 10 10 10 10 10 10 10 10 10
1847		A2BF	03660		JSR PRNTR	
184A	ØF	6F	63676		CLR (\$6F	
184C	16	FEA9	93688		LBRA FIN1	
			83698 83788		rom cassette t	and couting
						ape routine. routine and will return to main menu.
			83728			TO PULL BEING
184F		A928	63738		JSR CLS	- 54.4
1052		BD #667 FE2F	83748 83758		LEAX MESS, PCR LBSR PRINT	
1059		AICI	63766	WAIT2	JSR INKYS	
185C		FB	#377#		BEQ WAIT2	
					The Time Lat	

```
185F 81 83
                                   CMPA 4183
                    83788
1868 1827 FF94
                    43794
                                   LBER FINE
                    83888 +
                    #381# + Tape load routine is similar to that in Oct.83 Rainbow
                    #382# + page 84
                    #383# #
                                   LDB ##FF Select motor on.
1864 C6
                    #384#
1966 17
           BARR
                    #385#
                                   LBSR MOTOR
1869 1826 8286
                    43844
                                   LENE FRROM
1960 AF
          8D 849E
                    43874
                                   LDX NONAME.PCR
1871 86
           49
                    63886
                                   LDA #$49 Select input from tape.
1973 C6
         EE
                    43894
                                   LDB #$FF Select on screen.
1675 17
         8109
                    83988
                                   I RSR COPEN
 1078 1026 0277
                    81916
                                   LANE FRADR
187C 9E 84
                    83928
                                   I DY (RIJEEN
187E 17
          8218
                    43934 I DOP4
                                  LBSR CINPUT
1881 1826 826E
                    83948
                                   I RNE FRROR
1085 A7
                    #395#
          88
                                   STA . X+
1687 4D
                    43944
                                   TOTA
1888 26
                    63976
                                   RNE LOOP4
168A 36
         15
                    43994
                                   LEAX -1.X
188C 9F
          64
                    #199#
                                   STY CRUFFN
188E 17
          AIFE
                    44444
                                   LASE COLOSE
1891 1826 825F
                    84816
                                   I RMF FRROR
1895 C6 88
                    44474
                                   LDB #10 Select motor off.
1897 17 8884
                    44434
                                   LBSR MOTOR
189A 1826 8255
                    .....
                                  I RNF FRROR
189E 16 FE57
                    44454
                                  LBRA FINI
                    64868 4
                    64876 * Routine for user input of tape/disk filename.
                    .....
1441 BD
          4978
                    SAROR NAME
                                  198 CI 9
18A4 BE
          6200
                    84166
                                  LDX 45200
1007 CC
          2655
                    84116
                                  LDD #12655
1844 47
          85
                    84128 LOOP2
                                  STA . I+
1900 50
                    .....
                                  DECR
18AD 26
          FR
                    84148
                                  BNE LOOPS
IGAF BA
         #11A
                    84156
                                  LDA SIIA
1882 34
          82
                    84168
                                  PSHS A
IGRA BA
          FF
                    84178
                                  LDA #$FF Set the alpha lock for
IARA B7
          8114
                    84188
                                  STA $11A Capital letter filename.
1489 34
          80 846E
                   84198 REDO
                                  LEAY MES. PCR
1880 17
          FDCR
                    84288
                                  IRSE PRINT
1000 BD
         A393
                    84218
                                  JSP $A393 Get name.
18C3 D1
          an
                    84228
                                  CMP8 (LENGTH Valid length?
10C5 2E
         F 7
                    84238
                                  BGT REDO Do it again if invalid.
1607 35
         84
                   44744
                                  PULS B Reset the
1909 F7
         811A
                   44254
                                  STB #11A alpha lock.
18CC 39
                   44264
                                  PTG
                   84278 .
                   64286 * Routine to save text on cassette tape.
                    64296 * See Oct 83 Rainbow page 84
                    84388 +
 16CD C6
                    64316 CSAVE
                                 LDB 49
 16CF D7
          #D
                   64326
                                 STB (LENGTH
          CE
                    64336
                                 BSR NAME
          8D 85E6
 18D3 36
                   64346
                                 LEAX MESS. PCF
 1607 17
          FDAE
                    84358
                                 LBSR PRINT
 IADA RD
          AICI
                    FTIAM BATES
                                 JSR $AIC1
 16DD 27
          FB
                    84378
                                 BED WALTS
 18DF 81
                    84388
          43
                                 CHPA #583
 16E1 1627 FE13
                    64396
                                 LBEQ FINI
                    84488
                           Main CSAVE routine.
 18E5 CA
          EE
                    64416
                                 LDB #$FF Select motor on.
10E7 8D
         3B
                   84428
                                 BSR MOTOR
 18E9 1826 8288
                    84438
                                 LBNE ERROR
                                 LDX #$2DD
 10ED 8E 6200
                                             Point at name.
                    64456
 18F# 86
                                            Select output to tape.
 18F2 C6
          FF
                    84468
                                 LDB ##FF
                                           Select on screen.
 14F4 17
         6140
                    84478
                                 I BOR COPEN
 18F7 1826 81F8
                    84488
                                 LBNE ERROR
 18FB 9E #2
                    84498
                                 LDX (BUFST
 18FD A6
          88
                    84588 CLOOP
                                 LDA ,X+
                                          Read a character.
 18FF 4D
                    84518
                                 TSTA
 1166 27
                   84528
                                 BEQ SOUT
 1182 17 6170
                                 LBSR CSTPRT
                   84538
 1165 1826 BIEA
                   64546
                                 I RNE ERROR
 1169 26 F2
                    Ø4556
                                 BRA CLOOP
11AR 17 #173
                   64566 SOUT
                                 LBSR CSTPRT
116E 1626 81E1
                    44574
                                 I RNE FRROR
1112 17 6150
                   64586
                                 LBSR CCLOSE
1115 1826 #1DA
                                 LBNE ERROR
                    84596
1119 C6 66
                    84688
                                 LDB #$# Select motor off.
1118 8D 67
                    84618
                                 BSR MOTOR
111D 1826 #1D2
                   84628
                                 LBNE ERROR
 1121 16 FDD4
                   84638
                                 I RRA FINI
                   84648
                   84658 * This routine turns cassette motor on or off (8=8 : off)
                    .....
1124 17
                                 LBSR BEGIN
                   64678 HOTOR
          #1A7
 1127 5D
                    84688
                                 BNE HOTORN
          A7FR
                   84786
                                 JSR $A7ER Motor off.
 112A BD
```

```
112D 16
           #1C7
                    64716
                                   LBRA L21
 1138 BD
           A7CA
                     64726 HOTORN JSR $A7CA
                                               Motor on.
 1133 14
           61C1
                    64736
                                   LBRA L21
                    84748 +
                    64756 # Routine to process cassette file name.
                    84768 #
 1136 D7
                    64778 CNAME
 1138 CF
          Ø101
                    84798
                                   LDU ##1D1
 1138 AF
                    44794
                                   CLR ,U+
 113D C6
           28
                    64866
                                   I DR 4526
 113F F7
                    #481# CLEAR
                                  STR .II+
1141 1183 #1DA
                                   CMPU #$1DA
1145 25 FR
                    64836
                                   BLO CLEAR
1147 CF
          6102
                    SARAS
                                   I DII 44102
114A E6
                    64856 PNAME
                                  LDB .X+
114C C1
                    64866
                                   CHPB 4126
114E 25
                                   BLO RETURN
1156 F7
          CA
                    84888
                                   STB .U+
1152 7C
          AIDI
                    84898
                                  INC $1D1
1155 1183 61DA
                    84988
                                  CHPII #41DA
1159 25
         EF
                    84918
                                  BLO PNAME
115B 39
                    64926 RETURN
                    84936 ±
                    64946 * Abort save on tape/disk routines if text buffer is empty.
                    84958 a
115C BD
          A928
                   64966 NOTXT
                                  JSR CLS
115F 30
          8D 848C
                                  LEAX ERMES, PCR
1163 17
          FD22
                   84988
                                  LBSR PRINT
                    64996 WAIT4
1166 RD
          AICI
                                  JSR $AIC1
1169 27
          FR
                   85888
                                  RED MATTA
116B 16
          FD8A
                   65616
                                  LBRA FINI
                   #5#2# ·
                    65036 * Exit to basic with a cold start restoring interrupts and
                   85848 + alpha lock.
                   65656 ±
116E ØF
          71
                   ASAKA FYIT
                                 CIR ($71
1178 7E
         A#27
                   65676
                                  JMP QUIT
                   65686
                   05090 + Save on tape/disk routines.
                   45144 ×
1173 34
         82
                   ASIIA SAUF
                                 PSHS A
1175 DC
                                  LDD (BUFEN
                   05120
1177 93
                                  SURD (BUEST
                   65136
1179 27
         EI
                   85148
                                  BEQ NOTXT
117R 35
         62
                   45156
                                  PULS A
1170 81
         BA
                   85168
                                  CHPA #16
```

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117F 1627	FF4A	95179	LBEQ CSAVE	1249 27	#7	86148 E	BEQ OPENI
		#518# +		1248 81	4F	66156	CMPA #\$4F
		85198 + Disk	save routines. Refer to July 83 Rainbow page 71	124D 27	#9	86169 I	BEQ OPENO
		85288 ÷		124F 7E	A616		MP \$A616
1183 BD	2E	#521#	BSR SETUP	1252 BD	A629		JSR \$A629
1185 17	668D	85228	LBSR LABEL	1255 16	889F		BRA L21
1188 BE	<b>62DD</b>	<b>85238</b>	LDX #\$2DD		0071		
1188 1#8		85248	LDY #\$1FF	1258 4F	4150		CLRA
	4F	6525€	LDA 894F	1259 BD	A65B		JSR \$A65B
				125C 16	##98		LBRA L21
1191 C6	Ø1	#526#	LDB ##1			#623# ★ Routine	e to open disk file.
1193 17	<b>66</b> C9	#527#	LBSR OPEN	125F 8D	6D	86248 OPEN	BSR BEGIN
1196 26	56	Ø528Ø	BNE GOOFED	1261 10BF	8957	Ø625Ø S	STY \$957
1198 36	80 8532	85298	LEAX BUFF, PCR	1265 34	#6		PSHS D
119C A6	88	85388 WRITE	LDA ,X+	1267 BD	45		BSR FNAME
119E C6	81	Ø531Ø	LDB 451	1269 35	66		PULS D
11A# 17	88E5	65326	LBSR DSKPRT				
11A3 26	49	<b>85338</b>	BNE GOOFED	126B BD	C468		JSR \$C468
11A5 B1	66			126E 16	9886		LBRA L21
		65346	CMPA 440			#631# # Routine	e to close cassete tape file.
11A7 26	F3	85358	BNE WRITE	1271 8D	5B	#632# CCLOSE	BSR BEGIN
11A9 C6	<b>6</b> 1	#536#	LDB #\$1	1273 BD	A437	96339	JSR \$A437
11AB 17	88CA	65376	LBSR CLOSE	1276 26	7F	66346	BRA L21
11AE 26	3E	<b>#538#</b>	BNE GOOFED				e to close disk file.
11B# 16	FD45	#539#	LBRA FINI	1278 8D	54		BSR BEGIN
		85488 ±		127A D7	6F		
			ne to setup one buffer and verify on.				STB \$6F
		65426 +	THE CO BECOP ONE DOTTE: OND TETTING ONLY	127C BD	CA53		JSR \$CA53
11B3 C6	61		LDD AAL	127F 26	76		BRA L21
		85438 SETUP					e to write on tape.
1185 80	69	05440	BSR FILES	1281 BD	4B	86418 CSTPRT I	BSR BEGIN
11B7 C6	81	Ø545Ø	LDB #\$1	1283 BD	A298	86428	JSR \$A296
11B9 17	BBEB	Ø546Ø	LBSR VERIFY	1286 26	6F	66436	BRA L21
11BC 39		85478	RTS				e to write on disk.
		Ø548Ø +	4770	1288 BD	44	66456 DSKPRT	
			ne to load a disk data file,				
			HE to load a disk data file,	128A D7	6F		STB \$6F
		85588 +	PAR OFFICE	128C BD	A282		JSR \$A282
11BD 8D	F4	#551# LOAD	BSR SETUP	128F 20	66	86488	BRA L21
11BF 8D	54	05520	BSR LABEL			86498 * Routing	e to read tape file.
11C1 8E	#2DD	Ø553Ø	LDX 4\$2DD	1291 BD	38	86588 CINPUT	
11C4 1#8	E Ø1FF	85548	LDY #\$1FF	1293 BF	76		CLR \$76
1108 86	49	85558	LDA #\$49	1295 BD	A17F		JSR \$A17F
11CA C6	81	#556#	LDB #\$1				
11CC 17				1298 A7	68		STA Ø,S
	8898	Ø557Ø	LBSR OPEN	129A 2#	5B		BRA L21
11CF 26	1D	Ø558Ø	BNE GOOFED				e to read disk file.
11D1 9E	84	05590	LDX (BUFEN	129C BD	36	86568 INPUT	BSR BEGIN
11D3 C6	91	65666 READ	LDB 4\$1	129E D7	6F	66576	STB \$6F
1105 17	88C4	95619	LBSR INPUT	12A# BD	A176		JSR \$A176
11D8 26	14	<b>6</b> 562 <b>6</b>	BNE GOOFED	12A3 A7	E4		STA ,S
11DA A7	86	85638	STA ,X+		56		
		Ø564Ø		12A5 26	39		BRA L21
11DC 81	66		CMPA 458				e to set verify on.
11DE 26	F3	#565#	BNE READ	12A7 8D	25	86628 VERIFY	BSR BEGIN
11E# 3#	1F	#566#	LEAX -1,X	12A9 F7	<b>6987</b>	Ø663Ø	STB 1987
11E2 9F	84	#567#	STX (BUFEN	12AC 26	49	86648	BRA L21
11E4 C6	#1	<b>#</b> 568#	LDB #\$1				e to process disk filename.
11E6 17	##8F	85698	LBSR CLOSE	12AE C6	FF		LDB 60FF
11E9 26	#3	65766	BNE GOOFED	128# 5C	1.1	86678 GETLEN	
		65716					4'
11EB 16	FD#A		LBRA FINI	12B1 A6	85		LDA B,XZ
11EE 34	64	#572# GOOFED		1283 81	20	66696	CMPA 4920
11F# BD	A928	<b>65736</b>	JSR CLS	1285 24	F9	86788	BCC GETLEN
11F3 35	54	85748	PULS B	12B7 6F	E2	96718 C	CLR ,-S
11F5 36	BD #318	85758	LEAX ERRMSG, PCR	12B9 B6	895A		LDA \$95A
11F9 17	FCBC	85768	LBSR PRINT	12BC 97	EB		STA SEB
11FC 86	2F	65776	LDA \$\$2F				
11FE 4C		#578# ERR	INCA	12BE CE			DU 4494C
11FF C#	44	65796 EM	SUBB ###A		26		DA 4\$26
	ØA 50				CØ	66766 L22	STA ,U+
1201 24	FB	#58##	BCC ERR	1205 1183	8957	86779	CMPU #\$957
12#3 CB	3A	Ø581 <i>0</i>	ADDB #93A	1209 26	FB	66786 E	BNE L22
1265 BD	A38A	#582#	JSR #A3#A	12CB 7E	C8A4		IMP SCBA4
1288 1F	98	<b>65836</b>	TFR B,A				to prepare everything.(Registers,Error traps etc)
128A BD	A36A	#584#	JSR \$A36A	12CE 34	7A		PSHS X,Y,U,DP,A
1260 BD	A1C1	65856 LL1	J9R INKYS	1206 4F	/ m		
1216 27	FB	Ø586Ø	BEG LL1		OD		CLRA
1212 16	FCE3	Ø587Ø	LBRA FINI	12D1 1F	88		FFR A,DP
1212 10	, 525	#588# +		12D3 B6	#18E		DA \$18E
			t dish (i)		618F		DU \$18F
			ne to process disk filename.	1209 97	<b>BE</b>		STA (DSAVE
		65986 ÷		12DB DF	11		STU (\$11
1215 34	34	65916 LABEL	PSHS B, X, Y	12DD 86	7E		DA ##7E
1217 C6	ØD	65926	LDB ***D	12DF 33	8D 8816		
1219 D7	<b>6</b> D	65936	STB (LENGTH				LEAU ERROR, PCR
1218 17	FE83	#594#	LBSR NAME	12E3 B7	618E		TA \$18E
121E 35	B4	9595 <del>8</del>	PULS PC,B,X,Y		#18F		STU \$18F
1216 33	דע			12E9 A6		86928 L	DA ,S
	***		ne to setup disk system memory.	12EB 19DF	11		STS (STACK
1226 17	##AB	#597# FILES	LBSR BEGIN	12EE EE			.DU 6,S
1223 34	84	<b>#</b> 598 <b>#</b>	PSHS B		F8 #8		
1225 BD	CA3B	85998	JSR \$CA3B		. 0 00		JMP [8,S]
1228 35	84	86888	PULS B	1057			prough this routine if error.
122A F7	#95B	66616	STB \$95B	12F3 54			SRB
122D CE	<b>€</b> 928	66626	LDU #\$928	12F4 5C		66986 I	NCB
				12F5 26	63		9RA L25
1236 BE	#989	86838	LDX ##989				brough this if no error.
1233 6F	84	66646 DOBUF	CLR ,X	12F7 5F			CLRB
1235 AF	C1	86858	STX ,U++	12F8 26	44		
1237 36	89 #119		LEAX \$119,X	. 21 0 20			RRA L25
123B 5A		86878	DECB	IDEA DE	ar.		registers and return to caller.
123C 22	F5	86888	BHI DOBUF	12FA 96	ĐE .		DA (DSAVE
123E 16	##B6	86898	1 DDA 121		11		_DU <\$11
			ne to open cassete file.	12FE B7	#18E	67668 9	STA \$18E
1241 17	988A			1381 FF	618F		STU \$18F
			EDON DEGIN	1364 16DE			DS (STACK
1244 17		86128	LBSR CNAME	1307 35			PULS A, DP, U, Y, X
1247 81	49	86138	CMPA #\$49		***	2.2.0	



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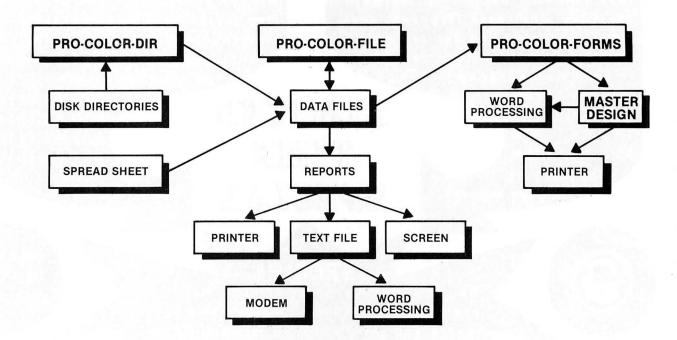


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	1369 32 1368 5D	62	67186 67118	LEAS 2,S TSTB		A 88	46	68676 68686 CHNS	ADDA 1146
	138C 39		#712# #713# + Edit	RTS routine uses video screen display area (\$406-\$5FF)	138	C 39			is routine converts back the screen byte into ASCII
			87148 + to d	isplay portions of text buffer for editing.					naracter for placing it in the text buffer.
				or uses direct page addresses as follows: : Cursor address upon entry to new screen page.		D 81 F 26	FF 63	88118 UNCH	ING CMPA #\$FF BNE NONULL
1				Start of current text buffer address corresponding	130	1 4F		68136	CLRA
				op left corner of video screen.		2 26	16 BF	88148 40154 NOVI	BRA UNOK JLL CMPA ##BF
				N : End of current text buffer address corresponding outcomer ight corner of video screen.		6 26	64	98169	BNE SKIP7
	1300 BE	8488	67216 EDIT	LDX \$\$490 First, the cursor pointer at top left corner.		8 86	<b>Ø</b> D	68176	LDA #96D
	1310 9F 1312 DC	6A	67226 67236 EDIT1	STX (CLM		A 20	6E 46	#818# #819# SKIP	BRA UNOK 27 CMPA <b>954</b> 0
	1314 DD	86	87248 NEWPGE			E 24	64	#82##	BHS SKIPB
		Ø1FF	67256	ADDD #\$1FF		6 8B	6 <b>6</b>	#821# #822#	ADDA 4\$66 Bra unok
	1319 1893 1310 25		67266 67276	CMPD (BUFEN BLO SKIP		4 81	60	88238 SKIF	
	131E DC	64	Ø728Ø	LDD (BUFEN		6 25	62	68246	BLO UNOK
	1326 83 1323 DD	6661 68	67296 67366 SKIP	SUBD #1 STD (MARGIN		8 86 A 39	46	68256 68266 UNO	ŞUBA 9940 Krts
	1325 17	50000	67318	LBSR COPY					is routine brings a copy of portion of the text
	1328 189	E #A	67326	LDY (CLM	170	B BD	A928	#828# + bu	uffer area to the video screen. / JSR CLS
				routine waits for user to press a key, Y reg. points he screen address of cursor location. The character			E 6488	88388 COLI	LDY \$\$466
				a black cursor (\$80) are flashed alternately until		2 9E	66	68316	LDX (SCL
	132B E6	A4	87368 * a ke			4 A6	8# 86	68326 COP	I LDA ,X+ BSR CHANBE
	132D 34	64	67388	PSHS B Save character on stack.		B A7	AØ	88348 COP	2 9TA ,Y+
	132F BE	6466	87398	LDX \$\$488		A 9C	68	68356	CMPX (MARGIN
	1332 BD 1335 BD	A7D3 A1C1	67466 67416	JSR DELAY JSR INKYS		C 23	F4 C <b>0</b> 600	68366 68376	BLS COP1 CMPY 45666
	1338 C9	86	87428	LDB #986 Get a black cursor.	13F	2 27	84	88388	BEQ COPOUT
	133A E7	A4	87438 87448	STB ,Y Place it at cursor pointer. LDX #1480		4 86	FF FØ	68396 68466	LDA #9FF Bra COP2
	133C BE	6488 A7D3	67458	JSR DELAY		8 39		Ø841Ø COPO	
	1342 35	54	87469	PULS B Get the character from stack.					nis subroutine takes the edited text from the screen
	1344 E7 1346 B1	84 88	87478 87488	STB ,Y Place it again at cursor pointer. CMPA ##					rea and places it back at the proper location in the ext buffer area.
	1348 27	EI	87498	BEQ EDWAIT	13F	9 1#8	E 8468		ISE LDY 41466
	134A 81	63	67500	CMPA #3 BREAK?		D 9E		68466 48474 OFW	LDX (SCL
	134C 26	86	67518 67526 + Alway	BNE SKIPØ ys revise the text buffer to match screen before		F A6	A# BA	68476 REV	LDA ,Y+ BSR UNCHNG
			67536 + exit		146	3 A7	86	68496	STA ,X+
	134E 17	66A8	67546	LBSR REVISE		5 9C 7 23	#8 F6	#85## #851#	CMPX <margin bls="" rev1<="" td=""></margin>
	1351 16	FBA4	87558 * Check	LBRA FIM1  if any of the arrow keys is pressed.		9 39	10	68526	RTS
			67578 + Revi	se cursor pointer if arrow key pressed.					Y > \$5FF cursor goes to top of next page in this
				ursor pointer goes beyond screen display area, o next page or previous page.					outine. The text buffer is always revised to match reen buffer before going to next page.
	1354 81	BA	67686 SKIP8		146	A 31	A9 FEBE		PBE LEAY -512,Y
	1356 26	ØD	97619	BNE SKIPI		E 169		68576	STY (CLW
	1358 31 1358 198	AB 28	87628 87638 EDCHK	LEAY 32,Y CHPY 005FF		1 BD	£6 #8	#858# #859#	BSR REVISE LDD (Margin
	135F 1622		67646	LBHI NXTPGE	141	5 C3	8881	68686	ADDD 41
	1363 26		67656	BRA EDWAIT CHPA ****		8 1893 R 182	7 FEF3	#861# #862#	CMPD <bufen edit1<="" lbeq="" td=""></bufen>
	1365 B1 1367 26	69 64	87668 SKIP1 87678	BNE SKIP2			FEF2	68636	LBRA NEWPGE
	1369 31	21	67686	LEAY 1,Y					Y $\langle$ \$488 the cursor goes to bottom of previous page.
	136B 26 136D 81		87698 87788 SKIP2	BRA EDCHK CMPA ##5E					ne text buffer is always revised to match screen buffer efore going to previous page.
	136F 26		67716	BNE SKIP3				#867# PRVF	PGE LEAY \$200, Y
	1371 31		67726	LEAY -32,Y		6 1 <b>8</b> 91 9 8D		#868#	STY (CLW
	1374 108		87738 EDCK 87748	CMPY 05466 LBLO PRVPGE		B DC		#869# #87##	BSR REVISE LDD <scl< td=""></scl<>
	137C 20		67756	BRA EDWAIT			6266	68716	SUBD 44286
	137E 81		67766 SKIP3	CMPA ###8		8 1893 3 182	5 <b>0</b> 2 5 FEDB	#872# #873#	CMPD <bufst LBLO EDIT1</bufst 
	138# 26 1382 31		87778 87788	BNE SKIP4 LEAY -1,Y			FEDA	68746	LBRA NEMPGE
	1384 26		. 87798	BRÁ EDCK					elete a character routine.
				R key will branch to DELETE routine and SHIFT CLEAR will branch to INSERT routine.					e character at a time is deleted and the text on reen is moved one to the left upto the bottom right
	1386 81	60	87828 SKIP4	CMPA 448C				#878# * co	rner of screen. The next character from the text buffer
	1388 162		Ø783Ø	LBEQ DELETE					ea is brought to screen. All the characters in the ext buffer are also moved one address down.
	138C 81		87848 87858	CMPA ##5C LBEQ INSERT	143	A IF	21		TE TFR Y,X Get cursor pointer in X reg.
			87851 * Place	the edited character at cursor pointer.		C 30		Ø882 <b>Ø</b>	LEAX 1, X X=X+1
	1392 BD 1394 A7		87868 87878	BSR CHANGE STA ,Y+		E 8C 1 27	26	#883# #884#	CMPX **666 Is it beyond screen buffer? BEQ DEL2 Go to DEL* if yes.
	1396 188		Ø788 <b>Ø</b>	CMPY 995FF		3 A6	84	68856	LDA ,X Set the character.
	139A 22		67896	BHI MXTPBE		5 A7	82	68866	STA ,-X Place it to the left.
	139C 28	80	87988	BRA EDWAIT routine changes the ASCII of character for		7 B1 9 26	FF 11	#887# #888#	CMPA **FF End of the text? BNE DEL1 Goto DEL1 if not.
			67926 + scree						d of text means time to revise text buffer.
	139E 81 13AØ 26	66 62	87938 CHANGE 87948			B 9E D 9F	88 84	68896 68966	LDX <margin STX <bufen< td=""></bufen<></margin 
	13A9 26	FF F	97959	BNE SK5 LDA ##FF		F 30	1F	88918	LEAX -1,X
	13A4 81	ØD	#796# SK5	CMPA ###D		1 9F	68	#892#	STX (MARGIN
	13A6 26 13A8 86	₿2 BF	9797 <b>9</b> 87989	BNE SKIP5 LDA ##BF		3 34 5 8D	26 A2	88938 88948	PSHS Y Save Video screen cursor pointer. BSR REVISE
	13AA 81	68	67996 SKIP5	CMPA #568	145	7 35	26	#895#	PULS Y Get back the cursor pointer.
	13AC 25	68	#8 <b>###</b>	BLO 9KIP6	145	9 16	FECF	88968 48961 + Yo	LBRA EDWAIT
	13AE B1 13B# 24	86	68616 68626	CHPA \$\$86 BHS SKIP6					ep on shifting characters to the left until end of deo screen buffer.
	13B2 8€	68	88636	SUBA \$\$68			#2	88978 DELI	LEAX 2, X
	1384 26 1386 81	96 48	88848 88858 SKIP6	BRA CHNGOK CMPA 9940		8C 27	8688	#898# #899#	CMPX **686 BEQ DEL2
	1388 24		88668	BHS CHNGOK		A6	84	69868	LDA ,X
_			20202	2.10 SANIGON	- 700				)"

147 73   73   74   74   74   75   75   74   74   74	144	E A7	00	40414	271				
##   ##   ##   ##   ##   ##   ##   #				69616	STA ,-X			89412 +	routine is required.
149   168   162   162   162   163	170	1 20	F3	5.05.55		14B7 34	16		
1499				99921 * 1180	to place first character from next text buffer	14B9 9E	84	89438	
1480 14	14//	0 05				1488 9F	#8	89448	
1483 A						14BD 38	#1	89458	
1447 77   2						14BF 9F	64		
1471 17   F722			100.00	0.000		14C1 35	19	89478	
1471   7 + 28						14C3 A7	84	Ø948Ø	
1477 8   For   1478   1479						1405 35	#2	89498	The second control of
1479 8   F						14C7 A7	AB	89588	
1477   18   27   27   27   27   27   27   27   2	14//	38	15				BF		
1478 86 84							-		
1470 27						14CB 1E	89		
140						3.043.44			
141						14CD 17	FFFD		
Mail 12									con and the control of the control o
1483 A7   87   891.4   * Smitt last Character one address down.   891.5   * This section accepts the remaining text buffer one address: up.   1485 87   84   891.6   817 (BUECN   1480 A7 88   9556   1853   1852	1481	1 29	F6						
1485 96						1102 00	<b>D1</b>		
1487 16   FEAT   89178   LBR EDWAIT   LBR			55.5			14D4 FA	94		and the v
1487   16   FEAT					STX (BUFEN				
# 1919#   All the text after cursor location is avoed one to the #919#   All the text after cursor location is avoed one to the #928#   right to make room for new user input. The text in the #921#   410k C 26   F6   896#   8918#   STA , X   #921#   * text buffer area after the character at botton right of #928#   418   480   84   896#   81   81   82   8918   81   82   8918   81   83   8918   81   83   8918   81   83   8918   81   83   8918   81   83   83   83   83   83   83	1487	16	FEA1					A 100 A	
## 1 the text after cursor location is moved one to the first after cursor location is moved one to the first after cursor location is moved one to the first after cursor location is moved one to the first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at bottom right of first after the first after the character at cursor pointer. I first after the fi							-		
### ### ### ### ### ### ### ### ### ##				69196 + All th	ne text after cursor location is moved one to the				
### 1488 IF 21 ### 222 # streem is also moved up one address at the same time. 142 35 # 82 #9328 # 9728 # 9				69288 * right	to make room for new user input. The text in the				
1488   F   21   87228   Screen is also moved up one address at the same time.   142   35   82   89536   PULS A Set the character to be inserted.   142   A7   A8   89648   STA ,YP Place it at cursor pointer; Y=Y+1				89218 + text b	ouffer area after the character at bottom right of		10-20-1		
1486   16				69228 + screen	is also moved up one address at the same time.		-		
# 97214   Whalf for insert.  148C BD   AICI   99246   INMAIT JSR INKYS   14E 23 9E   97668   BLS INSERT Go insert acre characters.     148F 27 FB   99256   BEQ INMAIT   14E 23 9E   97668   BLS INSERT Go insert acre characters.     1491 B1   63   69266   CMPA	148A	1F	21	#923# INSERT	TFR Y, X Get cursor pointer in X req.				
148C BD   ALC    89256   BP318   BP258   BEQ INMAIT   SPR INKYS   14EA 23 9E   89668   BLS INSERT Go insert more characters.   89661 * Make sure to revise text buffer corresponding to the   89687   BP3				89231 + Wait f	or insert.				
149	1480	BD	A1C1	89248 INWAIT	JSR INKYS				
1471   61   67   67   67   67   67   67	148F	27	FB	89258	BEQ INWAIT	14EH 23	76		
1497   1827   FEP4   89286   LBSC EDMAIT Exit insert mode.	1491	81	#3	59260	CMPA #\$3 BREAK?				
1497 17   F64   69286	1493	1627	FE94	69276	LBEQ EDWAIT Exit insert mode.	LACC 17	CEAN		
149R 34 82 89/299 PSNS A Save character to be inserted.  149R 36 88 89388 LDA , X+ Get character at cursor pointer : X=X+1  149R 149 149 149 149 149 149 149 149 149 149	1497	17	FF84			1466 17	LLAH		
149C A6 86 89386 LDA ,X+ Bet character at cursor pointer : X=X+1	149A	34	<b>6</b> 2	<b>6</b> 929 <b>€</b>	PSHS A Save character to be inserted.	LAFE DC	40		
1476 BC   6666   69316   CMPX \$\$666 Out of screen buffer?   1474 DD   66   69786   STO (SCL     1481 27   2A   69326   BEQ INS2 Go to INS2 if yes.   1476 C3   61FF   69716   ADDD \$\$1FF     1483 E6   84   69336 INS6   LDB , X Get next character in B reg.   14F9 1693 64   69726   CMPD (BUFEN     1487 BC   6666   69356   CMPX \$\$4566   CMPX \$\$456F End of text?   CMPX \$\$4566   CMPX \$\$456F End of screen buffer?   CMPX \$\$456F End of screen buf	149C	A6	86						
14A1 27	149E	BC	6666						
14A5 67 88			2A						
14A5 A7 88 89348 STA ,X* Place previous character to the right. 14FC 25 85 89738 BLD 1894 14A7 8C 8688 89358 CMPX **84686 14FE DC 84 89748 LDD (BUFEN 14A6 27 1F 89368 BEQ 1MS1 1588 83 8881 89758 SUBD #! 14AC LE 89 89378 EX B A,B Switch character from B to A 89751* Insert continues here when next text buffer is smaller 14AE 81 FF 89388 CMPA **8FF End of text? 89752 **than video screen buffer. 14B2 26 F1 89398 BME 1MS8 Keep on moving characters to the right. 1585 DD 88 89768 IMS4 STD (MARRIN 14B2 26 85FF 89488 CMPX **455FF End of screen buffer? 1585 17 FE03 89778 LBSR CDPY 14B5 27 EC 89418 BEQ 1MS8 BEQ 1MS9 BEC 1MS9 85FF End of screen buffer? 1586 189E 8488 87788 LDY **44888									
14A7 BC 8688 89358 CMPX \$1686 BEQ INSI 14A0 27 IF 89368 BEQ INSI 14AC IE 89 89378 EXB A,B Switch character from B to A 14AC IE 89 89378 CMPA \$45F End of text?  14BB 26 FI 89398 BE INSB Keep on moving characters to the right.  14BB 26 83FF 89488 CMPA \$45F End of screen buffer?  14BB 27 EC 89418 BEQ INSB BEQ INSB 1568 1688 8488 89788 LDY \$4486					· · · · · · · · · · · · · · · · · · ·				
14AA 27   IF									
14AC IE         89         \$9376         EXB A,B Switch character from B to A         \$6751 * Insert continues here when next text buffer is smaller           14AE B1         FF         \$9386         CMPA 48FF End of text?         69752 * than video screen buffer.           14BB 26         F1         \$9396         BNE INSØ Keep on moving characters to the right.         15Ø3 DD         \$8         \$9768 INSØ         \$15 (ABRBIN           14B2 8C         \$5FF         \$9486         CMPX 483FF End of screen buffer?         15Ø5 17 FED3         \$9776         LBSR CDPY           14B5 27         EC         \$9410         BEQ 1MSØ         15Ø5 18BE 8460         \$9780         LDY 48460									
14AE 81 FF 99386 CMPA #9FF End of text?		1000	•			1288 83	9991		0000 CC
1488 26 F1									
14B2 BC #5FF #94## CMPX #95FF End of screen buffer? 15#5 17 FED3 #977# LBSR COPY 14B5 27 EC #941# BEQ INS# 15#8 1#BE #4## #978# LDY #94###							40		
1485 27 EC 89418 BEQ 1MS8 1588 188E 8488 89788 LDY 84488									- 1
	1485	21						7	
FIFTH THE CEAL DUTTER IS SMALLER CHAIL SCREEN DUTTER FOLLOWING 130C TO FF/D 97/70 CDM INSERT				#7411 * When to	ext outter is smaller than screen butter tollowing	15#C 16	FF/8	89798	LBRA INSERT





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```
89888 NONAME FDB 8
1511
                   69816 ERRMS6
                                 FCC *(Break) TO EXIT. ERROR 4*
1529
          ....
                   49824
                                  FDR SA
                   APRIA HES
                                  FCC '
                                             I DAD / SAVE ROUTINE"
152R
          24
                                  FCB $8D
1541
         8D
                   69846
1542
          25
                   69856
                                  FCC .
                                             PRESS break TO EXIT*
          #D#D
                   #986#
                                  FDB $6D6D
1550
                    69876
                                  FCC * enter FILE NAME: *
156E
          88
                   69886
                                  FCB $8
1545
          6D
42
                    49894 FRNES
                                  FCB 960
1576
                                  FCC "BUFFER EMPTY"
                   49944
1570
                                   FCB $66
                    69916
                                  FCC * A SIMPLE TEXT PROCESSOR*
157D
                    89928 MESI
1598
          øD
                    49934
                                   FCB $60
                                              RY A.K. BASARGEKAR
1599
                    49944
                                  FCC +
                                   FDB $6060
15B1
          6D6D
                    89958
1583
                    89968
                              FCC . TEXT IN ( > WILL BE UNDERLINED+
          øD
1502
                    $9978
                    69986
                                   FCC * SELECT 1-8. HIT break FOR MENU*
                    #999a
          #D#D
                                   FDB $606D
15F2
                                  FCC + 1 - COMPOSE+
15F4
                    16666
                                   FCR $60
1600
          #D
                    16616
                                  FCC + 2 - EDIT+
          26
1661
                    18828
          øD
                    18636
                                   FCB SOD
168A
                    16846
                                   FCC " 3 - CLOAD"
168B
1615
          ØD.
                    18856
                                   FCR 44D
                                   FCC " 4 - DLOAD"
1616
          26
60
                    16666
                                   FCB SØD
                    18878
1420
          20
                    16686
                                   FCC + 5 - PRINT+
1621
          ØD
                    18898
                                   FCB $8D
162E
                    18188
                                   FCC + 6 - CSAVE+
                                  FCB $#D
FCC * 7 - DSAVE*
          50
                    16116
1637
          26
                    14174
                                   FCB SED
          #D
                    18138
1641
          28
                    16146
                                   FCC . 8 - EXIT+
1642
                    18158
1648
                                   FCC * TOTAL LINE WIDTH = *
                    18168 MES4
                                   FDR $888D
1669
           6660
                    18178
                    18188
                                   FCB ##D
1662
           6D
                                   FCC * LEFT MARBIN = *
           28
                    18198
1663
1672
           656D
                    16286
                                   FDB $866D
                    18218
                                   FCB $#D
FCC * LINE SPACING = *
1675
          76
                    18228
                                   FDB $888D
1485
           4440
                    16236
                    18248
1687
                     18258
                                   FCC * TURN ON PRINTER AND enter*
1688
           #D#D
                    18268
                                   FDB $4D6D
                                   FCC * OR PRESS break TO EXIT*
 16A4
           20
                    14274
                    18286
                                   FCB 6
           88
1ARR
                    18298
                                   FCB #
16BC
                    16386 HES5
                                   FCC "READY CASSETTE?"
                                   FDR $6066
           8066
                    16316
                    16326 BUFF
16CE
                                   RMB 6
           SESS
                                   END START
                    16336
```

#### One-Liner Contest Winner . . .

Did you ever hear the old question about whether a penny doubled each day for a month is more than a million dollars? This program gives you the true scoop on your printer.

#### The listing:

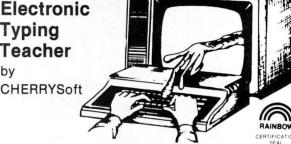
10 POKE150,42:PRINT#-2, "KING OF THE ONE-LINERS, PENNY DBLR"; CHR\$ (13); "SEND PRIZE TO Lee Veal, 88 09 Linda Vista, Rowlett, TX 7508 8": A=. Ø1: PRINT#-2: PRINT#-2, TAB(1 Ø) "AMOUNT"; " DAY": FOR X=1TO31:PR INT#-2, USING"\$\$###, ###, ###. ##"; A ;:PRINT#-2," "; X: A=A+A: NEXT

> Lee Veal Rowlett, TX

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)

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This is the final part in a series on diskette file organization

# The Diskette Directories Handler System

#### By Marvin E. Swan

he complete "Diskette Directories Handler" system is being presented in three parts. You must RUN program DIR1 before RUNning this month's program DIR3.

You can refer to RAINBOW two months ago for Part 1 and a full overview of all seven comprehensive reports generated by the *Handler* system and an explanation of program *DIR1*. You can refer to last month's RAINBOW for an explanation of program *DIR2*. To refresh your memory, here is the cross reference of all programs and reports and their *RUN* sequence:

Program Name	Optional Report	Report Title	Sequenced By:
DIR0	no	DOCUMENTATION	
DIRI	yes	#1 EXTR. & LOAD DIR	your own diskette filing
DIRI	yes	#2 DISKETTE NAMES	diskette name
DIRI	yes	<b>#3 DISKETTE USAGE</b>	number of bytes used
DIRI	yes	#4 DISK JACKET LABELS	your own diskette filing
DIR2	yes	#5 DISK LABELS (gum)	your own diskette filing
DIR3	no	#6 CONSOLIDATION	prog/size/diskette name
DIR3	no	#7 SUMMARY (stats)	

#### Consolidated Directories, Report #6

This month, report #6 is generated by program DIR3. The purpose of report #6 is to show all programs and data files cataloged to your PC system, sequenced by name, extension, format, type, granule size, byte size and diskette name. You can look up a particular program/data filename and see where it resides and how many multiple versions you may have saved to more than one diskette. An asterisk appears under the "FLAG" column when you have different byte-sized BASIC or machine language programs of the same name, allowing you to determine the correct version to RUN or EXECUTE. This report is the nucleus of the Handler system, which you will reference more often than others. You can cross reference all programs/data files in your PC system giving you the ability to purge and manage your entire diskette library.

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#### Disks Directory Summary, Report #7

This report is generated by program *DIR3*. The purpose of report #7 is to show statistical and percentage totals of all your diskettes, granules, bytes, programs and data files in your system. The following statistics and percentages will print:

- \* Total diskettes
- \* Bytes/granules used, not used, final total

(Note that percentage between granules and bytes do not match because granules are in increments of 2,304 bytes each and bytes are absolute.)

- \* Total BASIC, assembly and machine language programs
- \* Total data files
- \* Total multiple program versions with different byte size
- \* Total diskettes with disk read errors encountered
- \* Total reports you requested from *Handler* system.

The purpose of *DIR3* is to print the *Consolidated Directories* report #6 and the statistical *Disks Directory Summary* report #7. *DIR3* is automatically *RUN* by program *DIR2* if you previously selected optional report #5, otherwise it is automatically *RUN* by program *DIR1*. The entire catalog file is sorted in RAM

for the consolidation report. The sort is unique because it passes the catalog file six times, allowing for faster sorting on smaller amounts of data giving the advantage of being able to sort up to 2,100 records from disk. I strongly urge you to replace the BASIC bubble sort with a machine language sort. I purchased one advertised through RAIN-BOW that literally sorts in seconds. When DIR2 is complete, be sure to back up the catalog file to an archival diskette. The following BASIC line numbers contain Epson brand printer codes that you may change to satisfy your printer brand requirements and a high speed poke for the bubble sort: 0490, 0740 and 0820.

#### Program DIRO

The purpose of *DIR0* is to give you a quick blurb on how programs *DIR1*, *DIR2* and *DIR3* integrate. It gives you a record layout of the catalog file, BASIC line numbers within all programs for high speed pokes and Epson print codes and a host of other useful information. You do not have to *RUN* this program to process the *Handler* system. *DIR0* simply prints a quick and dirty explanation of the *Handler* system when you can't find your RAINBOW for reference.

#### The Final Saga

I sincerely hope you enjoy using the

Handler system. My friends and I have been using it successfully for about 18 months. I am putting together a subsystem to the Handler system which allows you to add and delete directory information to the catalog file without having to reprocess all your diskettes again when you want to regenerate the seven reports. I am hoping RAINBOW will share it with you in the near future.

#### 3-D Filing Cabinet With 'Windows'

If you have not been keying in th four programs, you may CLOADM them off the RAINBOW ON TAPE or mail a formatted diskette with \$8.50 to Marv's Computer Room, 17323 40th Avenue South, Seattle, WA 98188, and I will mail them to you. In addition to the "complete" Handler system, I will include a program that displays up to 15 graphic *PMODE4* windows, showing a filing cabinet with drawers that open and shut, and printer paper images with text coming out of the drawers and hanging in front of the cabinet. The Diskette Directories Handler system can be RUN from one of the four drawers. The other three drawers will surprise you. Windows are commonly used on the more expensive business micros.

All programs and documentation are copyright 1984 by Mary Swan.

FIL

### 

#### Listing 1:

10 '[DIR3]

20 'PROGRAM 3 OF 3

3Ø 'COPYRIGHT 1984 BY MARV SWAN

40 \*

5Ø CLS:PRINT

6Ø VERIFYON: GOTO93Ø

7Ø CLEAR195ØØ

8Ø DD\$="disks directory":L=66:T\$ ="FILE "

90 FT\$(0)="Program Basic":FT\$(1)
="Data File":FT\$(2)="Program Mac
h L":FT\$(3)="Program Assy L":DIM
D\$(450):G\$(1)="' ' TO 'B'":G\$(2)
="'C' TO 'E'":G\$(3)="'F' TO 'L'"
:G\$(4)="'M' TO 'Q'":G\$(5)="'R' T
O 'S'":G\$(6)="'T' TO 'Z'":G=1
100 GOSUB690:SOUND10,3:PRINT"mak

E CREATED BY PROGRAM DIR1 IN DRIVE Ø":PRINT@224, "type FILE NAME OF 1-8 CHARACTERSWITHOUT E XTENSION": PRINT" 11Ø PRINT@288, ""; : INPUTDI\$ 12Ø IFLEN(DI\$)<1 OR LEN(DI\$)>8 G OTO1ØØ 13Ø I=INSTR(DI\$,"/"):IFI<>Ø GOTO 100 14Ø I=INSTR(DI\$,"."):IFI<>Ø GOTO 100 15Ø FORX=3T011 160 DSKI\$0,17,X,A\$,B\$:F=INSTR(B\$ ,DI\$):IFF>ØTHENFT=FT+1 17Ø F=INSTR(A\$,DI\$):IFF>ØTHENFT= FT+1 18Ø NEXT 190 IFFT=0THENSOUND10,3:GOSUB690 :PRINT@128, "'";DI\$; "' NOT FOUND ON DISKETTE":PRINT"press ENTER T O retype FILE NAME": GOSUB700: GOT 0100 ELSEDI\$=DI\$+".DIR" 200 OPEN"I", #1, DI\$: INPUT#1, DA\$ 210 GOSUB680:PRINT" reading inpu t directory file ";:PRINT@129,T\$

e sure THAT THE DISK WORK

"NAME: ";: PRINT@14Ø. DI\$; 220 PRINT@161, T\$"DATE: "; :PRINT@1 72, DA\$;:PRINT@193, T\$"PASS:";: I\$= STR\$(G): I\$=RIGHT\$(I\$,1): PRINT@20 4, I\$" OF 6"; :PRINT@225, "REC # IN :";:PRINT@236, "Ø";:PRINT@257, "DA TA IN: ";: PRINT@268, "NONE"; : PRINT @289, "SEARCHING: ";:PRINT@3ØØ, "PR EFIX "G\$(G): 230 PRINT@352," records selected for sort ";:PRINT@385. "REC # OU T:";:PRINT@396,"Ø";:PRINT@417."D ATA OUT: ";:PRINT@428, "NONE"; 24Ø P=P+1 25Ø INPUT#1,R\$:TT=TT+1:I\$=STR\$(T T-1): I\$=RIGHT\$(I\$.LEN(I\$)-1):PRI NT@236, I\$S\$; 260 IFR\$="TØTALS"THENSOUND10,3:D \$(P)=R\$:S\$=STR\$(TT-1):S\$=" OF "+ RIGHT\$(S\$, LEN(S\$)-1): IFP<>1GOTO4 3ØELSE72Ø 27Ø PRINT@268, LEFT\$ (R\$,8) " "MID\$ (R\$, 9, 3); 28Ø A\$=LEFT\$(R\$.1) 29Ø IFG=1ANDA\$<"C"GOTO41Ø 300 IFG=1G0T0250 31Ø IFG=2ANDA\$>"B"ANDA\$<"F"GOTO4 10 32Ø IFG=2G0T025Ø 33Ø IFG=3ANDA\$>"E"ANDA\$<"M"GOTO4 10 34Ø IFG=3G0T025Ø 35Ø IFG=4ANDA\$>"L"ANDA\$<"R"GOTO4 10 36Ø IFG=4G0T025Ø 37Ø IFG=5ANDA\$>"Q"ANDA\$<"T"GOTO4 1Ø 38Ø IFG=5G0T025Ø 39Ø IFA\$>"S"GOTO41Ø 400 GOTO250 41Ø D\$(P)=LEFT\$(R\$,41) 42Ø I\$=STR\$(P): I\$=RIGHT\$(I\$, LEN( I\$)-1):PRINT@396, I\$;:PRINT@428,L EFT\$(R\$,8)" "MID\$(R\$,9,3);:GOTO2 43Ø SOUND1Ø,3:GOSUB82Ø:GOSUB68Ø: I\$=STR\$(G):PRINT" PRINTING REPOR T #6, PASS "RIGHT\$(I\$,1)"..." 44Ø IFG=1 THEN PT=INT((TT/57)+.9 99999999):PK=Ø 45Ø JK=Ø 460 IFL>60GOSUB650 ELSEGOTO530 47Ø PK=PK+1: IFPK<1ØTHENTB=46ELSE TB=45 48Ø IFPT>9THENTB=TB-1

49Ø PRINT#-2, TAB(5) DA\$; TAB(16) CH

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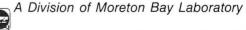
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```
R$(14):"consolidated directories
"; CHR$(2Ø); TAB(TB) "page"; PK; "of"
500 PRINT#-2: PRINT#-2, TAB(5) "nam
      ext format type"; TAB(40)
         bytes diskette name";T
"grans
AB (75) "flag"
510 PRINT#-2, TAB(5) "====
  ===== ; TAB(4Ø)"=====
=="
52Ø L=L+4
53Ø JK=JK+1:R$=D$(JK)
540 IFMID$(R$,12,1)="+"THENPRINT
#-2, TAB(5) "+++++++ +++ Fatal D
isk Read Error
                 ØØ
ID$(R$,22,20):GOTO610
550 IF MID$(R$,12,1)="B" THEN FR
MT$="Binary" ELSE FRMT$="Ascii"
560 TYPE=VAL (MID$ (R$, 13, 1))
57Ø BYTES=VAL (MID$ (R$, 16, 6))
580 IF HR$=LEFT$(R$,13) AND HBYT
E$<>MID$(R$, 16,6) THEN ERR$="*":
ERR=ERR+1:GOTO600 ELSE ERR$=""
590 HR$=LEFT$(R$,13):HBYTE$=MID$
(R$, 16, 6)
600 PRINT#-2. TAB(5) LEFT* (R*,8); T
AB(14)MID$(R$,9,3); TAB(19)FRMT$;
TAB(27)FT$(TYPE);TAB(43)MID$(R$.
14,2);:PRINT#-2,TAB(46);:PRINT#-
2, USING"###, ###"; BYTES; : PRINT#-2
,TAB(55)RIGHT$(R$,20);:IF ERR$="
" THEN PRINT#-2 ELSE PRINT#-2, TA
B(78) ERR$
61Ø L=L+1
620 IFJK=P-1G0T0720
63Ø IFL>6ØGOT046Ø
64Ø GOT053Ø
65Ø IFL=66G0T067Ø
66Ø PRINT#-2:L=L+1:IFL<>66GOTO66
67Ø L=Ø:RETURN
68Ø SOUND1Ø.3
690 CLS2:PRINT@1, "PRINT CONSOLID
ATED DIRECTORIES"; :PRINT@41, "PRO
GRAM 3 OF 3";:PRINT@96,"";:RETUR
700 I$=INKEY$:IFI$=""GOTO700ELSE
71Ø FORS=1TO5ØØ:NEXTS:RETURN
72Ø IFG<>6THENCLOSE#1:G=G+1:P=Ø:
TT=Ø:GOTO2ØØ
73Ø GOSUB69Ø:PRINT" PRINTING REP
ORT #7..."
74Ø GOSUB65Ø:PRINT#-2,DA$; TAB(15
); CHR$(14); "disks directory summ
ary"; CHR$ (2Ø); TAB (47) "page 1 of
1"
75Ø INPUT#1,T$,T
```

```
760 IFT$="1"THENPRINT#-2:GOTO750
77Ø IFT$="END"THENCLOSE#1:PRINT@
416, ""; : END
78Ø IFRIGHT$(T$,7)="flagged"THEN
T=ERR
79Ø J=4Ø-LEN(T$):PRINT#-2,TAB(9)
:PRINT#-2, USING"#, ###, ###, ###"; T
;:PRINT#-2,STRING$(J,".");:PRINT
#-2,T$
800 IF(RIGHT$(T$,7)="flagged"AND
ERR>Ø) THENI=(ERR/TT) *1ØØ: I=I+.25
: I=INT(I):PRINT#-2, TAB(9):PRINT#
-2, USING"#, ###, ###, ###"; I; : PRINT
#-2, ".....percentage ver
sions flagged"
81Ø GOT075Ø
820 POKE65495,0 '<==== note
83Ø GOSUB69Ø
84Ø FORX=1TOP-1:P1=INT((X/P)*1ØØ
):PRINT@96,P1;"% SORTED"
85Ø FORY=X TOP-1:IFD$(Y)<D$(X)TH
ENS1 = D + (X) : D + (X) = D + (Y) : D + (Y) = S1
860 NEXTY: NEXT X
87Ø PRINT@96," 100 % SORTED"
88Ø PRINT@16Ø,P-1"RECORDS SORTED
890 IFP-1>50THENPRINT@224," WHEW
1 1 "
900 FORX=1T0800:NEXT
91Ø POKE65494.Ø
92Ø RETURN
93Ø PMODEØ:PCLEAR1:GOTO7Ø
```

290 . . . . . 41 580 . . . . . 184 760 . . . . . 248 END . . . . . 255

Listing 2:

10 'CDIRØ]

20 '

30 'DOCUMENTATION FOR PROGRAMS DIR1, DIR2 AND DIR3

40 'RUN THIS PROGRAM AND A HARD COPY WILL PRINT EXPLAINING THE 3 PROGRAMS

5Ø '

60 '

70 '

8Ø VERIFYON: CLEAR5ØØ

90 DATA" Documentatio n"

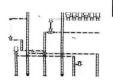
100 DATA" "

11Ø DATA" for"

12Ø DATA" "

13Ø DATA"Diskette Directories Ha

140 DATA"Programs DIR1, DIR2 and



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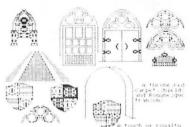
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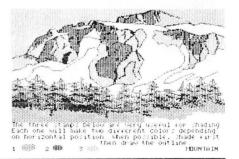
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DIR3" Swan" 16Ø DATA" 17Ø DATA" rograms" 21Ø DATA" " 22Ø DATA" " 24Ø DATA" 25Ø DATA" 26Ø DATA" 27Ø DATA"

15Ø DATA"Copyright 1984 by Marv

180 DATA"The Diskette DIrectorie s Handler system consists of 3 p

190 DATA"that generate all your diskette directories information

200 DATA"7 comprehensive reports

23Ø DATA"Minimum computer system requirements:"

\* 32K OF RAM"

\* EXTENDED DISK BASIC

\* 1 DISK DRIVE"

\* 1 TAPE DRIVE" 1 PRINTER" 28Ø DATA"

29Ø DATA"

300 DATA"Program DIR1 explanatio n: "

\* READ ALL DISKETTE D 31Ø DATA" IRECTORIES IN YOUR SYSTEM"

32Ø DATA" AND EXTRACT INFORMA TION ABOUT ALL YOUR PROGRAMS & F ILES"

33Ø DATA" \* GENERATE TAPE WORK FILE OF DIRECTORIES CONTAINED ON ALL DISKETTES"

34Ø DATA" \* PRINT (OPTIONAL) XTRACT & LOAD DIRECTORIES' REPOR T #1"

35Ø DATA" \* STORE DISKETTE NAME S & USAGE IN TABLE"

\* SORT DISKETTE NAMES 36Ø DATA" TABLE"

37Ø DATA" \* PRINT (OPTIONAL) 'D ISKETTE NAMES' REPORT #2"

38Ø DATA" \* SORT DISKETTE USAGE TABLE"

39Ø DATA" \* PRINT (OPTIONAL) 'D ISKETTE USAGE' REPORT #3"

400 DATA" \* TRANSFER TAPE WORK FILE TO DISK WORK FILE ON DRIVE

\* READ DISK WORK FILE 41Ø DATA" AND PRINT (OPTIONAL) DISKETTE J ACKET"

42Ø DATA" LABEL' DIRECTORY RE **PORT #4"** 

43Ø DATA" \* THIS PROGRAM PASSES THE DISK WORK FILE ON DRIVE Ø T



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O PROG DIR2 AND/OR DIR3" 440 DATA" \* THIS PROGRAM LINKS AND CALLS UP PROGRAM DIR2 OR DIR 3 ON DRIVE Ø" 45Ø DATA" " 460 DATA"Program DIR2 explanatio n: " 470 DATA" \* THIS PROGRAM IS RUN AFTER PROGRAM DIR1" 480 DATA" \* READ DISK WORK FILE GENERATED BY PROGRAM DIR1 FROM DRIVE Ø" 490 DATA" \* PRINT 'DISKETTE GUM LABELS' REPORT #5" 500 DATA" \* THIS PROGRAM LINKS AND CALLS UP PROGRAM DIR3 ON DRI VE Ø" 51Ø DATA" " 520 DATA "Program DIR3 explanation 530 DATA" \* THIS PROGRAM IS RUN AFTER DIR1 OR DIR2" 54Ø DATA" \* READ DISK WORK FILE GENERATED BY PROGRAM DIR1" 550 DATA" \* SORT DISK WORK FILE IN RAM. TO PROGRAMS & FILES SE QUENCE" 56Ø DATA" \* PRINT 'CONSOLIDATED DIRECTORIES' REPORT #6" 57Ø DATA" \* PRINT 'DISKS DIRECT ORY SUMMARY' REPORT #7" 58Ø DATA" " 590 DATA"record layout of tape w ork file & disk work file:" 600 DATA" \* RECORD SIZE = 42 BY TES" 610 DATA" \* 01-08 = 08 BYTE = N AME OF PROGRAM OR DATA FILE" 62Ø DATA" \*  $\emptyset9-11 = \emptyset3$  BYTE = E XTENSION" 63Ø DATA" \* 12-12 = Ø1 BYTE = F ILE FORMAT CODE" 64Ø DATA" A = ASCII" 65Ø DATA" B = BINARY" 66Ø DATA" \* 13-13 = Ø1 BYTE = F ILE TYPE CODE" 67Ø DATA" Ø = BASIC PROGRAM"68Ø DATA" 1 = DATA FILE" 69Ø DATA" 2 = MACHINE LANGUAGE PROGRAM" 7ØØ DATA" 3 = ASSEMBLY LANGUAGE PROGRAM" 71Ø DATA" \* 14-15 = Ø2 BYTE = N UMBER OF GRANULES" \* 16-21 = Ø6 BYTE = N 72Ø DATA"

UMBER OF BYTES" 73Ø DATA" \* 22-41 = 2Ø BYTE = N AME OF DISKETTE" 740 DATA" \* 42-42 = 01 BYTE = S PECIAL CODE USED BY PROGRAM DIR1 75Ø DATA" 'X' IDENTIFIES EVERY OTHER DISK ETTE DURING DIR1 AND DIR2" 76Ø DATA" " 770 DATA"Printer brands:" 78Ø DATA" \* ALL PROGRAMS PRINT ON ANY PRINTER, HOWEVER, REPORT" 790 DATA" TITLES ARE DESIGNED & CODED TO PRINT ENLARGED LETTE RS USING" 800 DATA" EPSON CODES. TO MO DIFY FOR OTHER PRINTERS, LOOK AT LINES: " 81Ø DATA" \* DIR1: Ø82Ø Ø83Ø 2680 3790" 82Ø DATA" \* DIR2: Ø51Ø Ø96Ø 1020 1030 1040 1330" 83Ø DATA" \* DIR3: Ø49Ø Ø74Ø 84Ø DATA" " 850 DATA"High speed poke:" 860 DATA" \* THE FOLLOWING PROGR AMS USE THE HIGH SPEED POKE FOR" 870 DATA" FAST SORTING. AKE OUT THE POKE, LOOK AT LINES: 88Ø DATA" \* DIR3: Ø82Ø" 89Ø DATA"END" 900 VERIFYON: CLS2: PRINT@1, " DISK ETTE DIRECTORIES HANDLER ";:PRIN T@40." DOCUMENTATION ": 910 PRINT@129," ready THE PRINTE R ";:PRINT@193," press ENTER WHE N READY "; 920 I = INKEY : IFI = "GOTO 920 93Ø PRINT@289," PRINTING..... 940 PRINT@384,""; 95@ READA\$:IFA\$<>"END"THENPRINT#

# CO CO -ADS

-2,A\$:GOTO95Ø

96Ø END

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# Designing Your Own Adventure

#### By George Firedrake and Art Canfil Rainbow Contributing Editors

f you have never played a role playing game and want to begin playing, try a play-by-mail (PBM) game. Flying Buffalo Inc. created the play-by-mail industry. Anyone can learn to play these games. No previous gaming experience is required.

Begin by getting the rules for the game you play from Flying Buffalo Inc., Dept. GMA, P.O. Box 1467, Scottsdale, AZ 85252-1467. Below are names of PBM games and the prices for the rules.

— STARWEB	\$2.00
— HEROIC FANTASY	1.00
— BATTLE PLAN	0.50
<ul> <li>NUCLEAR DESTRUCTION</li> </ul>	0.25
<ul> <li>GALACTIC CONFLICT</li> </ul>	1.00
— STARLORD	1.00
<ul> <li>BOARD OF DIRECTORS</li> </ul>	0.25
— FEUDAL LORDS	1.00

Last time we suggested you sign up for HEROIC FANTASY and make a move every two weeks or once a month. First get the rules, then design a party of Adventurers and send them in as described in the rules, of course.

Your characters can be human or otherwise. Each character is a fighter or magic-user, but not both. The strength (STR) of a character is used to attack other characters or monsters, to defend oneself and others, cast

(George Firedrake, a.k.a. Bob Albrecht, is one of the most prolific authors in the microcomputer world today. A specialist in writing for beginners, he is author of numerous books including TRS-80 Color BASIC. Art Canfil enjoys designing games and writing. He is co-author of Taipan: A Game In Context.)

magic spells, and numerous other things. The constitution (CON) of a character determines the amount of damage a character can withstand and continue living. Each character type has a price (COST). Here are all possible character types.

CODE	KINDRED	CLASS	STR	CON	COST
F	Fairy	Fighter	1	1	1
F	Fairy	Magic-user	1	1	2
G	Gremlin	Fighter	3	4	3
L	Leprechaun	Magic-user	3	4	4
H	Hobbit	Fighter	5	15	5
H	Hobbit	Magic-user	4	15	7
K	Goblin	Fighter	7	20	6
P	Human	Fighter	15	30	9 .
P	Human	Magic-user	10	30	11
E	Elf	Fighter	25	25	15
E	Elf	Magic-user	20	25	18
D	Dwarf	Fighter	30	40	23
D	Dwarf	Magic-user	30	40	36
O	Ogre	Fighter	35	40	29
O	Ogre	Magic-user	35	40	46
T	Troll	Fighter	50	50	57
X	Giant	Fighter	60	60	72

For any character, you may choose the name and whether the character is male or female.

You assemble a party of Adventurers by "buying" up to 15 characters. You have 100 points to spend in acquiring characters.

You have 100 points to spend.

Let's try it. For our first group, how about a big guy and 14 tiny helpers? Our group consists of a giant and 14 fairy magic-users.

QTY	KINDRED	CLASS	STR	CON	<b>POINTS</b>
1	Giant	Fighter	60	60	72
14	Fairy	Magic-user	14	14	28
		TOTALS	74	74	100

Or, instead of 14 fairies, let's try seven leprechauns.

<b>QTY</b> 1 7	KINDRED Giant Leprechaun	Fighter	<b>STR</b> 60 21	CON 60 28	<b>POINTS</b> 72 28
		TOTALS	81	88	100

The second bunch is higher in both STR and CON than the first group.

When Frodo, et al. set forth to return the ring to Orodruin, his group included hobbits, humans, elves, and dwarves (plus Gollum, of course). Let's put together our own Fellowship of the Ring.

QTY	KINDRED	CLASS	STR	CON	<b>POINTS</b>
2	Hobbit	Fighter	10	30	10
2	Hobbit	Magic-user	8	30	14
1	Human	Fighter	15	30	9
1	Human	Magic-user	10	30	11
1	Dwarf	Fighter	30	40	23
1	Elf.	Fighter	25	25	15
1	Elf	Magic-user	20	25	18
			118	210	100

This Adventuring party has much more total CON and STR than either previous group. Of course, we really don't know what is important until we send one of our groups into the labyrinth and find out what happens.

YOUR TURN. Design your own bunch of Adventurers. Remember, you have 100 points to spend and you can select, at the most, 15 Adventurers. Choose a name for each character and decide who is male and who is female.

#### CoCo Can Help Design A Group

The ratios of STR to COST and CON to COST might be useful indexes to help design a group of Adventurers. Here are some examples.

Fairy fighter: STR/POINTS=1 CON/POINTS=1
Fairy magic-user: STR/POINTS=5 CON/POINTS=1
Goblin fighter: STR/POINTS=1.17 CON/POINTS=3.67

Goblins are durable, compared to their cost, while fairies are fragile, relative to their cost. You can buy a lot of CON for your money by stocking up on goblins!

We have in mind several programs to help design Adventuring teams and play *HEROIC FANTASY*. First, we need a database of information about character types. Here it is:

32000 REM\*\*HEROIC FANTASY GMA 21 32002 REM\*\*CHARACTER TYPES 32004 REM\*\*CODE\$,KIN\$,CLASS\$,STR

, CON, PTS 32010 DATA F,FAIRY,F,1,1,1 32020 DATA F, FAIRY, M, 1, 1, 2 32030 DATA G,GREMLIN,F,3,4,3 32040 DATA L, LEPRECHAUN, M, 3, 4, 4 32050 DATA H,HOBBIT,F,5,15,5 32060 DATA H, HOBBIT, M, 4, 15, 7 32070 DATA K, GOBLIN, F, 7, 20, 6 32080 DATA P, HUMAN, F, 15, 30, 9 32090 DATA P, HUMAN, M, 10, 30, 11 32100 DATA E, ELF, F, 25, 25, 15 32110 DATA E,ELF,M,20,25,18 32120 DATA D, DWARF, F, 30, 40, 23 3213Ø DATA D,DWARF,M,3Ø,4Ø,36 3214Ø DATA 0,0GRE,F,35,4Ø,29 3215Ø DATA O,OGRE,M,35,4Ø,46 3216Ø DATA T, TROLL, F, 5Ø, 5Ø, 57 32170 DATA X,GIANT,F,60,60,72 3218Ø DATA Z,ENDFILE,Z,Ø,Ø,Ø

This is a small data file consisting of 18 records. Each record contains information about one character type. For instance:

Line 32004 tells you the names of the variables that we will use to store information from a DATA statment.

32004 REM\*\*CODE\$, KIN\$, CLASS\$, STR, CON, PTS
32060 DATA H, HOBBIT, M, 4, 15, 7

The last record, called ENDFILE, with CODE\$ = "Z", is not a character type. It is the End-of-File (EOF) record.

32180 DATA Z,ENDFILE, Z, 0, 0, 0

End-of-File record
(No more records in the file.)

We have written two programs that use the data file of *HEROIC FANTASY* character types.

The SCAN CHARACTER TYPES program begins at Line 1000. It lets you scan the entire file. To run it, type RUN or RUN 1000. It begins like this.

F FAIRY F 1 1 1 TO DO AGAIN, PRESS SPACE BAR

SPACE BAR is in reverse color.

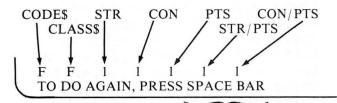
Press the space bar and you get the next record.

F FAIRY F 1 1 1 F FAIRY M 1 1 1 TO DO AGAIN, PRESS SPACE BAR

Keep pressing the space bar until you see 15 records on the screen. Press the space bar again to get the 16th record — the top record is "pushed off the top of the screen" and

Keep pressing the space bar until ENDFILE appears at the bottom of the screen. Press the space bar again and the CoCo starts over with the first record.

The COMPUTE COST RATIOS program begins at Line 2000. Type RUN 2000 to run this program. First you see:

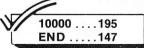


reverse color

This program works the same way as the SCAN CHAR-ACTER TYPES program. Each time you press the space bar, you see another line of information near the bottom of the screen. If you see ENDFILE and press the space bar, the CoCo starts over at the top of the data file.

Here are both programs and the subroutines they use.

#### The listing:



1 REM\*\*HEROIC FANTASY GMA 21-1 1000 REM\*\*SCAN CHARACTER TYPES 1010 CLS 1020 RESTORE 'START AT TOP 1030 GOSUB 11010 'READ RECORD 1040 GOSUB 12010 'SHOW RECORD 1050 GOSUB 10010 'TELL HOW AGAIN 1099 1100 REM\*\*START OVER IF ENDFILE 1110 IF KINS="ENDFILE" THEN 1020

1199 ' 2000 REM\*\*COMPUTE COST RATIOS 2010 CLS 'START AT TOP 2020 RESTORE 2030 GOSUB 11010 'READ RECORD 2040 GOSUB 13010 'COST RATIOS 2050 GOSUB 14010 'SHOW RATIOS 2060 GOSUB 10010 'TELL HOW AGAIN 2099 2100 REM\*\*START OVER IF ENDFILE 2110 IF KINS="ENDFILE" THEN 2020 **ELSE 2030** 2199 3 10000 REM\*\*DO AGAIN SUBROUTINE 10010 PRINT @480, "TO DO AGAIN, PRESS space bar"; 10020 IF INKEY\$="" THEN 10020 ELSE RETURN 10099 ' 11000 REM\*\*READ RECORD SUBR. 11010 READ CODE\$, KIN\$, CLASS\$, STR , CON, PTS 11Ø2Ø RETURN 11099 " 12000 REM\*\*SHOW RECORD SUBR. 12010 PRINT @480. CODE\$ TAB(2) KIN\$ TAB(16) CLASS\$ TAB(19) STR TAB(23) CON TAB(27) PTS 12Ø2Ø RETURN 12099 3 13000 REM\*\*COST RATIOS SUBR. 13010 IF KINS="ENDFILE" THEN SC=Ø: CC=Ø: RETURN 13020 SC = STR/PTS 13030 SC = INT(100\*SC+.5)/10013Ø4Ø CC = CON/PTS 13Ø5Ø CC = INT(1ØØ\*CC+.5)/1ØØ



ELSE 1030

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by C.E. Laidlaw

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by Terry A. Steen

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- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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Canadians may order from Kelly Software

14000 REM\*\*SHOW COST RATIOS SUBR 14010 PRINT @480, CODE\$ TAB(2) CLASS\$ TAB(5) STR TAB(9) CON TAB(13) PTS TAB(17) SC TAB(24)CC 14020 RETURN 14099 ?

Of course, remember to add the data file (lines 32000 through 32180) to the programs.

- To run SCAN CHARACTER TYPES, type RUN or RUN 1000 and press ENTER.
- To run *COMPUTE COST RATIOS*, type *RUN 2000* and press ENTER.

These are "bare bones" programs. Try your hand at improving them. Also think about other programs to help

you design an Adventuring team and guide them as they explore the labyrinth.

#### Who Is A Character?

A character is any imaginary person or other creature created according to the rules of a game system. The characters in *HEROIC FANTASY* are quite simple. The characters in *Dungeons & Dragons* or *RuneQuest* are much more detailed and complex. Characters in *Adventurer's Handbook* are simplified versions of characters found in the very elegant *RuneQuest* system.

We need a way of recording a character's characteristics, abilities, knowledge, possessions, and anything else we want to remember. Below is a blank character record. You may copy it for your own use.

Character Name _ Background						_ Sex	x		_ Rac	ce					_
STR CON SIZ INT POW DEX CHA	Idea Luck Dodge Persuade	 HIT PT 11 12  Armou  POW P 11 12	2 13 r		0	1	2	3	4	5	6	7		9	10
	reisaace	 11 12	- 15												
SKILLS CLIMB FIRST AID HIDE JUMP LISTEN MOVE QUIETLY SPOT HIDDEN SWIM THROW					PELL		%		AT					%	
	v		_	EQU	IPME	ENT					N 	MONE	EY		

Last time we showed you the character record for Aloysious Anonymous, a very average character. Now meet Rokana.

Character Name . Background	Rokuna				_ Age	_10	6	Se	x _ F	-	Rac	e	Hu	MEV.	_		
STR 9				PTS			0	1	2	3	4	5	6	7	8	9	
CON 9			11	12	13	14	15	16	17	18	19	50	21	22	23	24	25
SIZ 9		5.2					J.		1.4								
INT	Idea	_85_	Arm	our	_	Cloth	1,	P	ner!	-	_	_	-	_	_	_	_
POW	Luck	90							2	2	4	5	6	7	8	9	10
DEX 4	Dodge	45_		12 12			0	1	2	3	19		21		23		25
CHA _10	Persuade	_30_	11	12	13	14	15	10	17	(18)	13	20	41	22	ω.	24	23
						10.00											-
SKILLS							APON st	S	DAM			TAC	K.	PARE	IY.	BRK	P15
CLIMB	_65	_	_	_	-	_	XX.	-	10			55	- 1	-	- 1	_	
FIRST AID	40			_			AFF	-	10	-	-	_	-	35	- 7	15	
HIDE	60		_	_		-2	AP.	-	113	-	-	,,,	-	23	-	_/-	_
JUMP	<u>55</u>					_	_	-	_	_	-	_	-	_	-	_	_
LISTEN				-		-	_	-	-	_	-	_	-	_	-	_	
MOVE QUIETLY	30		-					-	_	_	-		- 1		-	_	
SPOT HIDDEN	30		_			_	_	-	_	_	-		-		-		
SWIM	55		_				PELL			6			PEL				6
THROW	- 22			_		-	HUNG		9	-		-	PEL	L.		-	0
			_	_			TECTI		24		-				-	_	
	_		_			-	CHIT		25	_					_	_	
					-		-	-	-	_	-						

Rokana is a beginning magic-user. She has learned three magic spells called HEALING, PROTECTION, and LIGHT. However, she has not yet mastered these spells. She

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has a 35 percent chance of successfully casting a HEALING spell and a 25 percent chance with PROTECTION or LIGHT.

Next time we will take Aloysious, Rokana, and perhaps some other characters to a county fair where they can have a wonderful time exercising their skills. In the meantime, we suggest you do some homework. Dig out the following back issues of THE RAINBOW and read "GameMaster's Apprentice."

August 1983 — pages 74-78 October 1983 — pages 170-174 November 1983 — pages 140, 144, 146, 148

Do any of you want us to run a small play-by-mail game? In this game, you would run one character like Aloysious or Rokana. You take your character to a county fair. Today they are called "Renaissance Faires," but in the world of Aloysious and Rokana they were contemporary fairs.

No previous experience is needed to play our play-by-mail game. Your only costs will be a copy of *Adventurer's Handbook* and some self-addressed, stamped envelopes. If you want to play, send a self-addressed, stamped envelope to DragonFun, P.O. Box 310, Menlo Park, CA 94026.

#### **ROLE PLAYING GAMES**

Millions of people play fantasy role playing games. A role playing game is a game in which one or more players create and play characters (adventurers) who live their imaginary lives in a specially made game world. The game world is created, managed, and operated by a Game Master (GM), referee, or dungeon master (DM).

Most people who play role playing games use a formal rule system. Some of the best known are shown below.

Champions. Hero Games, 92A 21st Avenue, San Mateo, CA 94402.

Dungeons & Dragons (D&D). TSR, P.O. Box 756, Lake Geneva, W153147.

RuneQuest (RQ). Chaosium, P.O. Box 6302, Albany, CA 94706.

Traveller. Game Designer's Workshop, P.O. Box 1646, Bloomington, IL 61701.

Tunnels & Trolls (T&T). Blade, P.O. Box 1210, Scottsdale, AZ 85252.

Beginners beware! The rule books are formidable. If you are a beginner, we suggest you start with one of the following books, both from Reston Publishing Company, 11480 Sunset Hills Road, Reston, VA 22090.

Adventurer's Handbook: A Guide to Role Playing Games by Bob Albrecht & Greg Stafford.

Through Dungeons Deep by Robert Plamondon.

In "Game Master's Apprentice," we include how-to-play information for all beginners.

Copyright® 1984 by DragonQuest, P.O. Box 310, Menlo Park, CA 94026.



One-Liner Contest Winner . . .

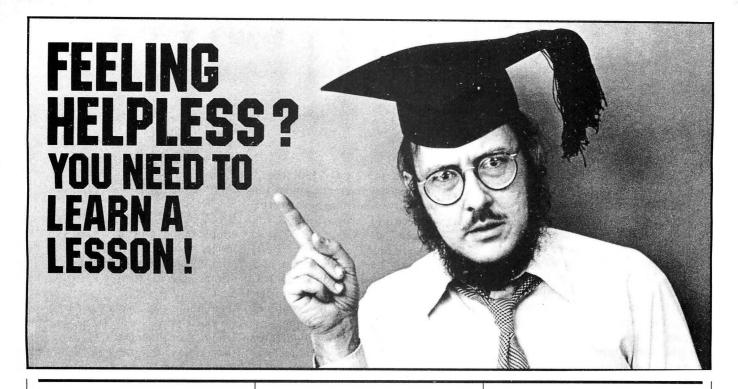
This shows the moon with many stars in the background. Let it run for a while (a half hour or so); it gets better with age!

> Mark Perry Rutherfordton, NC

#### The listing:

Ø PMODE4:PCLS:SCREEN1,1:CIRCLE(1
60,50),45,,.8:PAINT(160,50),1,1:
FORX=1T0999999999:PSET(RND(255),RND(192)):PRESET(RND(255),RND(192
)):NEXT'LET RUN FOR HALF A HOUR
OR SO.

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventure* and its companion *Rainbow Adventure Tape.*)



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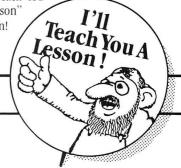
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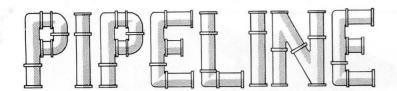
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some in advanced information storage technology in Japan by Nippon Columbia, parent of Denon America, Inc. Nippon Columbia, credited with developing digital audio recording in 1972, has applied the technology of the Compact Disc to a very high capacity read-only memory storage system for personal computers. Dubbed the CD-ROM, the new disc has the same compact dimensions (4¾ inches) and uses the same type of laser pickup "player" mechanism as the audio Compact Disc.

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For more information about the CD-ROM system, contact Robert Heiblim, Denon America, Inc., 27 Law Drive, Fairfield, NJ 07006; (201) 575-7810.

THE PRINTED WORD. Several recently released books are now available that Color Computer users might find interesting. First in the lineup are *The Computer Blue Book* and the *Orion Buyer's Guide to Computers*, published by Orion Research, 1315 Main Avenue,

Suite 230, Durango, CO 81301. Both books are industry reference guides for both the buyer and seller in the marketplace and are available for \$49.50 apiece.

Next we come to Digital Deli, authored by "the Lunch Group and Guests" and edited by Steve Ditlea. Billed as "the computer book with the human touch," this book combines contributions from 140 authors and artists into a 400-page potpourri of computer lore and culture and technological trivia. Digital Deli is available for \$12.95 from Workman, 1 West 39 Street, New York, NY 10018.

If you're interested in success stories, there is *The Computer Entrepreneurs*, a look at the biggest names in the computer industry and how they made it to the top. Written by Robert Levering, Michael Katz and Milton Moskowitz, *The Computer Entrepreneurs* is an intimate portrait of these new cultural heroes. It is currently available for \$19.95 from NAL Books, 1633 Broadway, New York, NY 10019.

Finally, we come to a two-volume reference set entitled Abbreviations: The Comprehensive Dictionary of Abbreviations and Letter Symbols for the Computer Era (it probably took two volumes just to get the name across the cover). The title pretty well says it all except that the volumes are arranged separately: one contains words to abbreviations and the other contains abbreviations to words. Abbreviations was compiled by C. Edward Wall and is currently available for \$98 through

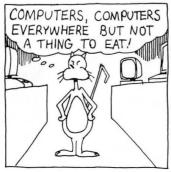
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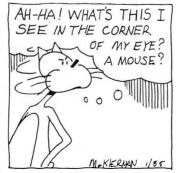
BACK ON THE LINE. Glancing at a couple of the information networks this month, CompuServe Incorporated has announced that they have entered into a joint agreement with VideoFinancial Services of Dallas, Texas, to expand their home and small business market for video banking by personal computer. Under the agreement, all CompuServe subscribers will be able to conduct transactions electronically with any bank in the country linked through VideoFinancial's computer gateway facilities. CompuServe will be the first nationwide computer network to offer this service, which is expected to be active on the system by March of 1985. For more information, contact Carl Byoir & Associates, Inc., 401 North Michigan Avenue, Chicago, IL 60611; (312) 527-5100.

The Business Computer Network has recently announced that they have added Knight-Ridder's VU/TEXT to their system. This means that their subscribers can now get the full text of the Washington Post, the Philadelphia Enquirer and the Miami Herald, with plans to have the Boston Globe online by the end of the year and the Chicago Tribune, Detroit Free Press and the Associated Press's Datastream soon after that. For more information, contact Business Computer Network, Inc., 1000 College View Drive, Riverton, WY 82501; or call Fred Rackmil at Howard J. Rubenstein Associates, (212) 489-6900.

#### CoCo Cat

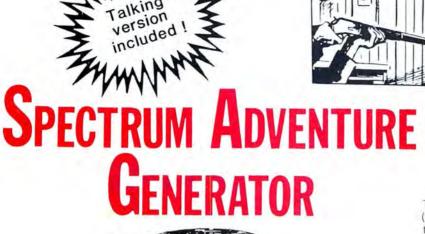














The Spectrum Adventure Generator (SAG) allows you to create silent and talking adventure games that are 100% machine language and very fast in execution. Up to 99 rooms, 255 objects, 70 command words and 255 conditional flags can be used. Get a head start in next month's Rainbow Adventure Contest NOW! 32K/64K DISK \$39.95

Note - Talking version requires Spectrum Projects' Voice Pak, a Disk "Y" Cable or Mulitpak and 64K.

Quotes from Jorge Mir (#1 CoCo Adventure Expert) from Dec'84 Rainbow Review -

"Overall, I think this is a great system for those interested in writing adventures. It sure eliminates a lot of time involved in developing them and allows the non-programmer to develop some very interesting Adventures since no programming knowledge is required. Try SAG, you'll like it!"

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# The Hi-Res lowercase punctuation Interpretation Figure 1988. The Figure 1988 of the Partial Pa

I'm sure most of you ambitious amateur programmers are familiar with the profound message of KISS, "Keep It Simple, Stupid!" Yet some people never seem to learn and continue slaving over thousand-line programs for months, only to watch them die slowly before their eyes on the screen, wondering where they went wrong. To me, the beauty of programming is that the most successful programs are usually the shortest, supported by a good idea, written in a few hours time and gradually perfected over a period of weeks.

This is true in the case of *The Interplanetary Fruit Fly*. It's short, simple and demonstrates a nifty little technique for displaying pseudo high-resolution graphics on the text screen: "lowercase punctuation."

You're probably asking, "A which?!"

Let me explain. "Lowercase punctuation" is what I call all the periods, commas, question marks, brackets, etc., which your trusty old CoCo uses, with a special twist. Using *POKEs*, we can display these punctuation marks and other characters the same way the computer displays lowercase letters: the white symbol on a black rectangular background. With these characters, using a little ingenuity, we can create just about any figure we please.

These symbols can't be *PRINTed*, but, as I said before, the *POKEs* come to our rescue. I know some of you beginning programmers may shy away a little from *POKEs*. But don't worry, these *POKEs* are all addressed to the video RAM part of the computer, and can't interfere with its normal functioning, so bear with me.

The *POKE* addresses we are going to use range from 1024 to 1535, one location for every one of the 512 characters on the text screen. Except for the symbols we're interested in, most of the 256 characters available with *POKE* can be *PRINTed*, some only with the use of *CHR*\$ codes. To save

time, I have compiled a convenient list of the symbols we want and the value of each:

0 = @	38 = &	51 = 3
1-26 = alphabet	39 = "	52 = 4
27 = [	40 = (	53 = 5
28 = \	41 = )	54 = 6
29 = ]	42 = *	55 = 7
30 = 1	43 = +	56 = 8
31 = ←	44 = ,	57 = 9
32 = black rectangle	45 = -	58 = :
33 = !	46 = .	59 = ;
34 = "	47 = /	60 = <
35 = #	48 = 0	61 = =
36 = \$	49 = 1	62 = >
37 = %	50 = 2	63 = ?

Now, let's get to the point. Type in the program listing, but be careful! There is one of those useful but occasionally dastardly speed up *POKEs* in Line 5. Before you run the program, save it on tape. If you want to run it before that, delete Line 5 and add it again when you're ready to save.

After the opening title, a green stripe appears at the top of the otherwise black screen displaying the current score, high score and number of shots remaining,

(Martin Kaste is an American high school student living in Brazil. He develops programs for local home computer owners on his Color Computer.)



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DEALER/CLUB INQUIRIES INVITED SOFTWARE SUBMISSIONS WELCOMED respectively. The game starts immediately, but can be stopped using the pause feature on the CoCo.

The Interplanetary Fruit Fly has already started to make irritating kamikaze dives at you, and all you have to defend yourself with are fifty shots of space age fruit fly repellent! You are controlling a cannon loaded with the stuff at the bottom of the screen, which you move with the left and right arrow keys. With the help of two PEEKs, your cannon has continuous smooth movement, meaning that it keeps traveling until you release the key. The fire button, which is the up-arrow key, also has this feature.

The action in the game is not difficult to explain. The movements of the cannon and the projectiles it fires are simple: *POKE* the figure into the new location, cover up its trail with black *POKE 32s*. The cannon travels at

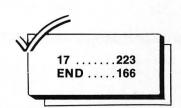
intervals of two spaces at a time, the projectile zips upward on a FOR/NEXT loop, jumping 32 spaces at a time for vertical movement. The Fly is a little more complicated, but not much. It flies down much the same way the projectile goes up, only the 32 spaces added each time are varied by a SIN(X) function, (Line 17). The result is a fly that weaves around and appears to dodge shots. As you probably guessed the flapping of its wings is an illusion caused simply by switching the parentheses back and forth, open and closed, in each step.

The player is awarded 500 points when he or she "wings" the Fly, 1,000 when the player manages to kill it, blasting the center of its body with the deadly repellent, and a new one takes its place almost instantly. The game ends if and when the Fly touches your cannon or when you run out of shots, whichever comes first. I suggest you

ration your shots, because they go quickly, so try to shoot only when the Fly is in range. Another tip: try not to let yourself be fenced into the corners; they're perfect for the Fly to nail you.

One last note for those of you with Extended Color BASIC. You may want to liven up the game a bit by substituting the SOUND commands with faster, more exotic PLAYs. I use PLAY"T 4505D04E03A#02DD01AADA" in Line 10, PLAY"T50D" in Line 19, PLAY"T50;01ADDE#D#AACA" in Line 24, and *PLAY"T250;01A* A05D03CCCCC" in Line 28. You can think up something much better. I'm sure. Also, feel free to change any characters that I used in the game. The program layout is simple enough to allow you to make all kinds of modifications.

Enjoy and happy spritzing!



#### The listing:

- Ø '\*\*\*THE\*\*\*\*\*INTERPLANETARY\*\*\*
- 1 \*\*\*\*\*\*FRUIT\*\*\*\*FLY\*\*\*\*\*\*\*
- 2 'BY\*\*\*MARTIN\*OLAF\*KASTE\*\*\*\*\*\*
- 3 \*\*\*\*\*\*\*\*\*MAY\*1984\*\*\*\*\*\*\*
- 4 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
- 5 POKE65495,Ø
- 6 CLSØ
- 7 FORA=1186T01213
- 8 FORC=C TO C+5:POKEA,RND(26):NE
- 9 PRINT@162, MID\$("the"+CHR\$(128) +"interplanetary"+CHR\$(128)+"fru it"+CHR\$(128)+"fly",1,A-1186);:S OUNDC,1:NEXTA
- 10 PRINT@189, "y";:FORA=1TO4:SOUN D50,1:SOUND75,3:SOUND150,3:SOUND 2,1:SOUND3,1:PRINT@200, "by"+CHR\$ (128)+"martin"+CHR\$ (128)+"kaste";:POKE1480,40:POKE1481,3:POKE148 2,41:POKE1483,32:PRINT@462,"smartsoft";:NEXT
- 11 FORN=1056T01535:POKEN, 32:NEXT
- 12 PRINT@Ø," "
- 13 PRINT@1,"ØØØØ";:PRINT@22,"SHO TS:";:PRINT@29,"5Ø";:IFHS=ØTHEN1
- 4ELSEPRINT@12, HS; 14 SH=50: XY=40: YX=41
- 15 A=1516

- 16 Z=1Ø56+RND(32):IFSH=<ØTHEN24 17 POKEZ,32:POKEZ+1,32:POKEZ+2,3 2:IFZ>15Ø3THEN16ELSEZ=Z+SIN(M)\*R ND(3):Z=Z+32:M=M+1:POKEZ,XY:POKE Z+1,43:POKEZ+2,YX:CC=XY:XY=YX:YX =CC
- 18 IFZ<A+3ANDZ>A-2THEN24
- 19 IFPEEK(341)=247THENFORC=A-31T 01Ø56STEP-32:POKEC, 42:POKEC+32, 3 2:NEXTC:POKEC+32, 32:SH=SH-1:PRIN T@28, SH;:IFPEEK(Z+1)=32THENS=S+1 ØØ0:GOSUB28:PRINT@1, S;:POKEZ, 32: POKEZ+1, 32:POKEZ+2, 32:GOTO16:ELS EIFPEEK(Z)=32ORPEEK(Z+2)=32THENS OUND5Ø, 1:S=S+5ØØ:PRINT@1, S;
- 2Ø IFSH=ØTHEN24
- 21 IF PEEK(343)=247THENB=-2:IFA= 1504THENB=0
- 22 IF PEEK(344)=247THENB=2:IFA=1 532THENB=0
- 23 POKEA, 32: POKEA+1, 32: POKEA+2, 3 2: A=A+B: B=Ø: POKEA, 47: POKEA+1, 42: POKEA+2, 28: GOTO17
- 24 SOUND1,2:SOUND13,1:SOUND1,3:S OUND2,4:SOUND1,2:FORA=1TO3ØØ:NEX T
- 25 PRINT@33,"TO PLAY AGAIN, PRES S THE A KEY";:A\$=INKEY\$:IFA\$<>"A "THEN25
- 26 IF HS<=S THEN HS=S
- 27 S=Ø:GOTO11
- 28 POKEZ, 62: POKEZ+2, 60: POKEZ-31, 22: POKEZ+33, 1: SOUND50, 1: SOUND150, 2: SOUND123, 1: SOUND140, 3: POKEZ, 32: POKEZ+1, 32: POKEZ+2, 32: POKEZ-31
- ,32:POKEZ+33,32:RETURN

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40 CIRCLE(128,95),36,2,1,.26,.35 :DRAW"BM116,129C2M-2,+8M-10,+7BM 86,105M-6,-5"

50 CIRCLE(53,82),32,2,1,.1,.24:D RAW"BM51,111F4G2H4L7F2L7G4H2E6L7 G2H2E4R2BL2M-4,-1H2L2U1E2M+10,+3 M+20,+1BL2M+14,-25M+6,-8M+2,-2M+ 4,-2"

60 CIRCLE(88,57),18,2,1,.3,.7:CI RCLE(108,54),18,2,1,.85,.2:CIRCL E(102,30),20,2,1,.5,.8:DRAW"BM82,40E2U7":CIRCLE(102,30),20,2,1,.

70 CIRCLE(113,25),20,2,1,.65,.85 :DRAW"BM118,12E7R4D6M-8,+8":CIRC LE(140,88),38,2,1,.7,.83:LINE(15 9,54)-(86,105),PSET:PAINT(90,80) ,1,2:PAINT(90,60),1,2

80 DRAW"BM173,81E7F2M+22,-8R2D2M -10,+4G3BE2M+6,-1M+6,+1F2D1L9G2M +10,+4G2M-10,-4L9G5L2H2U3L4H2":P AINT(180,78),1,2

9Ø CIRCLE(94,29),2,2,2:CIRCLE(1Ø 4,29),2,2;DRAW"BM96,56F2E2U2H2 G2D2":PAINT(98,55),2,2:DRAW"BM96 ,66F2E3BU24G3H2BU22BL2G4BR18BU1H 3"

100 GOTO 100

#### Nova

By Michael Rosenberg and **Tobin Wonn** 

10	2	****	NO	V	A	****
200	2	BY MICH	HAEL	RO	OSE	ENBERG

AND 30

40 TOBIN WONN MAY 10, 1984 50

**60 PCLEARS** 

70 PMODE 4,1:PCLS:SCREEN1,1

80 FORJ=0TO255STEP2

90 LINE(J, 191) - (128, 96), PSET: NEX

100 FORJ=0TO255STEP2

110 LINE (J. Ø) - (128, 96), PSET: NEXT

120 FORJ=0T0191STEP2

130 LINE(128,96)-(255,J), PSET: NE XT

140 FORJ=0T0191STEP2

150 LINE(128,96)-(0,J), PSET: NEXT

160 PMODE4, 5: PCLS: SCREEN1, 1

170 FORJ=0TO255STEP4

180 LINE(J, 191)-(128, 96), PSET: NE

XT

190 FORJ=0T0255STEP4

200 LINE (J, Ø) - (128, 96) , PSET: NEXT

210 FORJ=0TO1915TEP4

220 LINE(128,96)-(255,J), PSET: NE XT

23Ø FORJ=ØT0191STEP4

24Ø LINE(128, 96) - (Ø, J), PSET: NEXT

250 FURX=1105STEP4

260 PMODE3, X: SCREEN1, 1: FORY=1T01

00: NEXTY, X

27Ø GOTO25Ø

#### No Ghosts By Balinda Fortman

1 POKE65495, Ø

2 PMODE1.1

3 PCLS3

4 SCREEN1, Ø: POKE65314, 248

5 FORX=3T07

6 FORY=2TO6

7 FORZ=ØTO3

8 COLORZ

9 A=Ø:B=255:C=Ø:D=191

10 LINE (A, C) - (B, D) , PSET, B

11 A=A+Y:B=B-Y:C=C+X:D=D-X

12 IFA<255ANDC<191THEN10

13 NEXTZ

14 NEXTY, X

15 RUN

## An Optical Illusion

By Bryan Kerr

AN OPTICAL ILLUSION

BRYAN KERR

3 ' 1195 BRIARWOOD DR

4 ' JACKSON, MS

5 ' 8/17/83

10 PMODES, 1: PCLS: SCREEN1, 0

20 A\$="C4D3ØM-3Ø,-15U3ØNM+3Ø,+15 M+30,-15M+30,+15NM-30,+15D30M-30

, +15U3Ø"

30 DRAW"S3XA\$; BM-80, -40XA\$; BM+80 ,-40XA\$; BM+80, +40XA\$; BD80XA\$; BM-

80. +40XA\$; BM-80, -40XA\$;"

4Ø B\$="C1BM-3Ø,+15C1NU8D2NM+8,+4

U2BM+3Ø,-15":C\$="C1BM+3Ø,+15NU8D 2NM-8, +4U2BM-30, -15": D\$="C1BU29N M-8, +4NM+8, +4BD29" 50 E\$="C4BM-30,-15M-40,-20D10M+4 Ø, +2ØU1ØM+1Ø, -5M-4Ø, -2ØM-1Ø, +5M+ 40. +20BM+30. +15" 60 F\$="C4BD31D40NM-8,-4M+8,-4U40 BM-8, +4BM-8, -4ND4ØBM+8, +4BU31" 7Ø G\$="C4BD1M+3Ø,-15M+4Ø,-2ØNM-8 ,-4D1ØM-4Ø,+2ØU1ØM-1Ø,-5NM+4Ø,-2 ØM+1Ø.+5M-3Ø.+15" 8Ø DRAW"BM128,96C4XA\$;BU2XB\$;XC\$ ; XD\$; BD8@XD\$; BM-8@, -4@XC\$; XD\$; BU 80XC\$; BM+80, -40XB\$; XC\$BM+80, +40X B\$; BD80BM+80, +40XD\$; XB\$; XE\$; BU80 XB\$; BD8ØBM-8Ø, +4ØXG\$; XE\$; BM-8Ø, -40XG\$; BU80XF\$; XG\$; BM+80, -40XF\$; B M+80, +40XE\$; XF\$BM-80, +40XE\$; XF\$; BM-80, +40XG\$; XE\$; XF\$; 90 FOR C=2T03:FORT=1T015:READX, Y :PAINT (X, Y), C, 4: NEXTT, C 100 FOR T=1TO7: READX, Y: PAINT (X, Y ), 4, 4: NEXTT 110 DATA 128,94,130,153,128,30,1 60,74,188,60,68,60,96,74,96,49,1 58, 49, 68, 120, 188, 120, 116, 100, 140 , 100, 105, 140, 152, 140 120 DATA 135,95,130,160,130,37,1 90, 75, 190, 135, 70, 135, 70, 75, 130, 8 5, 130, 135, 118, 105, 95, 56, 165, 80, 1 58, 145, 190, 95, 70, 95 130 DATA 103,65,151,65,158,95,98 ,95,103,125,158,125,128,0 14Ø GOTO14Ø

#### The Hole

By Gregg A. Ford

1 'CIRCLE2 2 'GREGG FORD 3 '95 ELDRED BEDFORD, OHIO 44146 10 PMODE 4,1:PCLS:SCREEN 1,1:FOR X=10 TO 170 STEP 2 20 CIRCLE (128, 96), X, 7 30 NEXT 40 CLS:FOR X=10 TO 170 STEP 5 5Ø CIRCLE(128,96),X,7 **60 NEXT** 7Ø FOR X=1Ø TO 17Ø STEP 1Ø 8Ø CIRCLE(128,96), X,2 9Ø NEXT 100 FOR X=0 TO 170 STEP 4 110 CIRCLE(128,96), X,3 12Ø NEXT 13Ø FOR X=Ø TO 17Ø STEP 15 140 CIRCLE(128,96), X, Ø 15Ø NEXT

160 FOR X=10 TO 170 STEP 9 17Ø CIRCLE (128, 96), X, 4 18Ø NEXT 190 FOR X=10 TO 170 STEP 3 200 CIRCLE (128, 96), X,5 21Ø NEXT 220 FOR X=10 TO 170 STEP 1 23Ø CIRCLE(128,96), X,6 24Ø NEXT 250 FOR X=10 TO 170 STEP 2 260 CIRCLE (128, 96), X, 7, 2 270 NEXT 28Ø FOR X=1Ø TO 17Ø STEP 3 290 CIRCLE(128,96), X,8,2 300 NEXT 310 FOR X=0 TO 170 STEP 5 320 CIRCLE (128, 96), X, Ø, 2 330 NEXT 340 FOR X= 10 TO 170 STEP 7 35Ø CIRCLE(128,96), X,1,2 360 NEXT 37Ø FOR X=Ø TO 17Ø STEP 1 38Ø CIRCLE (128, 96), X, 6 39Ø NEXT X 420 CLS: PRINT@232, "THAT'S ALL FO LKS!" 43Ø GOTO 43Ø

#### The Impossible Cube

By Stephen Lai

5 ' IMPOSSIBLE CUBE
10 PMODE4,1:PCLS:SCREEN1,0
20 DRAW"S44BM34,3NFR12NM-1,2F5NM
-2,1D12NH2L12NEH5NU12URNM+2,1ER3
D2L2F2NUBM+1,2ENRBU3NR3U2NR3U3NR
3HNELH3ND7M-1,-2M+3,1NF3R7F4D9UH
3U4NR3U2NR2U2HLD3NL3D5FNRGF3"
30 FORF=1TO8:READA,B:PAINT(A,B):
NEXT:DATA0,0,100,30,60,70,140,90
,190,90,170,50,140,160,76,140
40 GOTO40

#### Pascal's Triangle

By Stephen Lai

5 ' PASCAL'S TRIANGLE
10 DIM P(256)
20 PMODE 4,1:PCLS:SCREEN 1,1
30 P(128)=1
40 FOR S=1 TO 127
50 FOR F=128-S TO 128+S STEP 2
60 P(F)=P(F-1)+P(F+1)-SGN(P(F-1)+P(F+1))\*2
70 PSET(F,S,P(F)+5)
80 NEXT F,S
90 GOTO 90

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Ever become exasperated with the acrobatics required by the SHIFT @ method of stopping a fast-scrolling LIST? Or have you sometimes wanted to format the margins and line length of your LLISTINGS? Now you can easily accomplish either of these things by employing one of the useful processes described here.



By H. Allen Curtis

his article concerns two programs which produce new varieties of CoCo's LIST and LLIST commands. The programs apply regardless of the size of RAM or the type of BASIC in your CoCo.

Have you ever become exasperated trying to use SHIFT @ to stop the listing process at an appropriate place? The program of Listing 1 was written to avert such exasperation. This program offers you the option of two different varieties of *LIST* commands. Henceforth, the program of Listing 1 will be referred to as *Lister*.

Under the first option, Lister will produce a slow LIST command. With that LIST command, the scrolling of the BASIC lines will take place slowly. The slowed scrolling gives you the needed SHIFT @ control in the strategic stopping of the listing process. This LIST variety can operate at any one of five different speeds. You may choose the speed you find to be most convenient.

The second *LIST* variety operates at the normal speed, but without scrolling.

(H. Allen Curtis resides in Williamsburg, Va. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.)

With this variety, when the screen is filled to a point where scrolling would ordinarily occur, listing is automatically stopped. You then must press ENTER for the screen to clear and the listing to resume at the top of the screen. Rather than stopping the listing process with SHIFT @, you must press ENTER to start it

"... you may modify
LIST and LLIST to meet
your particular needs.
Disassemblies of the
machine language
subroutines associated
with Lister and LLister
should prove helpful in
making modifications."

The key to producing the two *LIST* varieties is the employment of the "hook" at RAM addresses 422 through 424. This hook connects the ROM routine for the *LIST* command with RAM. This hook is not used by Color BASIC, Extended Color BASIC or Disk BASIC. Therefore, it is available to use in the

alteration and improvement of the *LIST* command.

In the slow LIST variety, the hook is made to connect the ROM's LIST routine with a machine language subroutine residing at the 61 highest RAM locations of your CoCo. In the no-scroll variety of LIST, the hook connects the LIST routine and a 43-byte machine language subroutine stored in high RAM.

The values in the *DATA* statements of lines 180 and 190 of *Lister* are the 16 bytes comprising the subroutine associated with the slow *LIST*. Likewise, the values of the remaining *DATA* statements, lines 200 through 260, are the bytes that comprise the subroutine associated with the no-scroll *LIST* command.

Lines 10 through 40 are employed to store the subroutine of slow *LIST* in high RAM as well as setting the appropriate hook address. Lines 90 through 110 along with Line 130 serve a similar purpose for the no-scroll *LIST*. Line 170 completes the connection between the ROM's *LIST* and the selected variety. Line 120 checks the accuracy of your typing of the *DATA* statements.

Except for Line 5, the other lines of *Lister* are concerned with prompts to aid you in taking your *LIST* variety options. The *REM* of Line 5 informs

120 . . . . 122 END . . . . 87

#### Listing 1:

5 REM TO RETURN TO NORMAL LIST POKE422,57 10 X=256\*PEEK(116)+240:CLEAR100. X-12Ø X=256\*PEEK (116) +24Ø 30 FORI=0T015:READA:POKEX+I.A:NE XT 4Ø POKE423, PEEK (116): POKE424, 24Ø 50 CLS: PRINT@134, "CHOOSE LIST VA RIETY": PRINT@166, "BY PRESSING 1 **OR** 2 60 PRINT: PRINT" 1. SLOW": PRINT: PRINT" 2. NO SCROLL 70 K\$=INKEY\$: ON VAL(K\$) GOTO140, 90 8Ø GOTO7Ø 9Ø X=256\*PEEK(116)+213:CLEAR100, 100 X=256\*PEEK(116)+213:FORI=0TO

11Ø FORI=ØTO42:READA:B=B+A:POKEX

+I,A:NEXT 120 IFB<>6844THENCLS:PRINT"DATA ERROR": STOP 130 POKE424, 213: POKE422, 126: END 140 CLS: PRINT@164, "FOR A FASTER SLOW LIST": PRINT" PRESS A NUM BER KEY FROM": PRINT" 1 TH ROUGH 4. ": PRINT" OTHERWISE, P RESS ENTER. 150 K\$=INKEY\$: K=VAL(K\$): IFK<5 AN D K>Ø THEN16ØELSEIFK\$=CHR\$(13)TH EN17ØELSE15Ø 160 K=256/2^K:POKE256\*PEEK(116)+ 249, INT (K+.5) 17Ø POKE422, 126: END 18Ø DATA 52, 16, 134, 254, 145, 111, 3 9.6 190 DATA 142,0,0,189,167,211,53, 144 200 DATA 220, 136, 159, 66, 227, 132 21Ø DATA 147,66,16,131,5,224,44 220 DATA 1,57,182,2,220,129,155 23Ø DATA 39,248,129,182,39,244 240 DATA 52, 16, 189, 163, 144, 189 250 DATA 169,40,48,95,189,185 26Ø DATA 156, 12, 137, 53, 144

you how to return to the normal LIST from either variety of LIST.

15: READA: B=B+A: NEXT

The subroutines of both LIST varieties will occupy the same RAM area as RAINBOW Check Plus. Therefore, if you make use of RAINBOW Check Plus as an aid in the correct typing of Lister, do not run Lister until it has been completely and accurately typed.

After correctly typing *Lister*, save it on tape or disk, then *RUN* it. You will quickly receive the first prompt. To test

Lister initially, press the '1' key to select the slow LIST variety. Doing this immediately produces another prompt. The slow LIST will operate at one of five speeds. Pressing ENTER will make it operate at its slowest speed. Pressing 1, 2, 3 or 4 will, respectively, make it operate at two, four, eight or 16 times the speed of the slowest LIST.

Press ENTER to get the slowest *LIST*. Then type *LIST*, press ENTER, and test the use of SHIFT @ to stop the listing

process. Run Lister four more times. Each time select the slow LIST variety, but at a different speed. Determine what speed is most convenient for you by LISTing Lister and stopping it by means of SHIFT @.

In another run of *Lister*, select the no-scroll *LIST* variety, then *LIST* the program. Note that the listing stopped after completing only BASIC Line 5. Listing Line 10 would have caused scrolling, so the process was stopped.

# Listing 2: 1Ø CLS: X=256\*PEEK(116)+194: CLEAR 1ØØ, X 2Ø X=256\*PEEK(116)+195 3Ø FORZ=X TOX+6Ø 4Ø READA: B=B+A: POKEZ, A: NEXT 5Ø IFB<>5998THENPRINT"DATA ERROR ":STOP 6Ø PRINT@231," ";: INPUT"MARGIN"; M 7Ø POKEX+6Ø, M 8Ø INPUT" LINE LENGTH"; L 9Ø L=L+M: POKEX+43, L 1ØØ IFPEEK(32768)<>69THENPOKEX+1

1,57
11Ø IFPEEK(186)=6THENPOKEX+12,13
Ø:POKEX+13,115ELSEPOKEX+12,203:P
OKEX+13,74
12Ø POKE36Ø,PEEK(116):POKE361,19
5
13Ø DATA 52,124,246,2,22Ø,193
14Ø DATA 155,39,5,53,124,57,Ø,Ø
15Ø DATA 48,14Ø,42,129,13,39,34
16Ø DATA 23Ø,132,38,16,23Ø,1,52
17Ø DATA 6,231,132,134,32,189
18Ø DATA 162,133,9Ø,38,248,53,6
19Ø DATA 92,193,8Ø,39,4,231,132
20Ø DATA 32,215,189,162,133,134
21Ø DATA 13,111,132,32,206,0,0

Pressing ENTER permits the nearly full screen display of lines 10 through 80. By pressing ENTER again, you will be shown lines 90 through 140. Two more similar presses of ENTER will complete the program listing. As you have seen, the noscroll *LIST* lets you examine BASIC lines at your own pace.

Setting Margins With LLister

Would you like to start a notebook of program listings? Or, would you like to have the ability to select the left margin size and the number of characters per line of any hard copy listing? If so, the program of Listing 2 should be of interest to you. The product of this program, called *LLister*, is a new variety of *LLIST* command that allows you to format your hard copy listings insofar as left and right margins are concerned.

Another hook, at addresses 359 through 361, is the key to the development of a new variety of *LLIST* command. The *DATA* statements (lines 130 through 210) of *LLister* comprise a 61-byte machine language subroutine that will be connected via the hook to the ROM's *LLIST* command routine. Lines 10 through 40 of *LLister* are concerned with storing the aforementioned subroutine at the highest 61 RAM locations. Line 50 provides a check on the accuracy of your *DATA* values typing.

Both Extended Color BASIC and Disk BASIC make use of the hook at addresses 359-361, but Color BASIC does not. *LLister* sets a hook address entry to the 61-byte machine language subroutine. For systems with Extended Color BASIC or Disk BASIC, *LLister* also sets the subroutine exit address, which is the replaced hook address entry to the appropriate BASIC ROM. Lines 100 through 120 are used to set up the hook address and the exit address, if needed.

The remaining lines of *LLister* provide prompts to enable you to specify the desired left margin size and the number of characters per line.

A high RAM conflict exists between LLister and RAINBOW Check Plus. When using the latter, do not run LLister until it has been typed correctly. If you are using a new LIST, type and ENTER POKE422,57 to disable it before running LLister.

When you have finished the required typing, save *LLister* on tape or disk. Turn your computer off and turn on your printer and CoCo in the recommended sequence. *LOAD LLister* and *RUN* it.

A MARGIN prompt will soon appear

ADDRESS	HEX	CODE	MNEMONIC	OPERAND	COMMENT
3FFØ	34	10	PSHS	X	;Save X
3FF2	86	FE	LDA	#FE	;A is printer device number
3FF4	91	6F	CMPA	6F	;Is LLIST current command?
3FF6	27	96	BEQ	3FFE	; If so, go to exit
3FF8	8E	99 99	LDX	#0000	;X is delay constant (POKEd from BASIC for speeds 1 thru 4)
3FFB	BD	A7 D3	JSR	A7D3	Delay
3FFE	35	90	PULS	PC,X	Restore X and exit
			Tab	le 1	

ADDRESS	HEX	CO	DE		MNEMONIC	OPERAND	COMMENT
3FD5	DC	88			LDD	88	;D is cursor position
3FD7	9F	42			STX	42	Save line address
3FD9	E3	84			ADDD	, χ	Add next pointer
3FDB	93	42			SUBD	42	D is cursor position
							if current line were
3FDD	10	83	95	EØ	CMPD	Ø5EØ	; Would cursor be on
							bottom screen line?
3FE1	20	91			BGE	3FE4	; If so, branch
3FE3	39				RTS		;Exit
3FE4	B6	92	DC		LDA	Ø2DC	;A is current command
							token
3FE7	81	9B			CMPA	#9B	; Is command LLIST?
3FE9	27	F8			BEQ	3FE3	; If so, go to exit
3FEB	81	86			CMPA	#B6	; Is command EDIT?
3FED	27	F4			BEQ	3FE3	; If so, go to exit
3FEF	34	10			PSHS	X	¡Save X
3FF1	BD	A3	90		JSR	A39Ø	; Wait for ENTER to be
	1						pressed
3FF4	BD	A9	28		JSR	A928	(Clear screen
3FF7	30				LEAX	-1,U	;X points to ASCII
							representation of current line number
3FF9	BD	R9	90		JSR	B99C	Print line number
3FFC	90	300			INC	89	
3FFE	35				PULS	PC, X	Bump cursor position Restore X and exit
	-	"			IOLU	10,1	skestore x and exit
					Table	2	

on the screen. The prompt requires you to type the margin size. A frequently used margin size is 10 characters long. Thus, type 10 and press ENTER.

The next prompt asks you to specify the line length. For an 80-column printer, 60 characters per line will yield left and right margins of 10 characters each. Therefore, type 60 and press ENTER.

Test the new LLIST command by using it to LLIST LLister. RUN LLister several times and try LLISTing with different margin and line length selections. If the selected margin size and line length total more than 80 characters, LLister will reduce the line length to 80 minus the margin size.

LLister as presented does not have any effect on the PRINT#-2 command, but it can easily be made to do so. If you would like to employ LLister to select and use margins and line lengths on other matter as well as BASIC programs, make the following changes in LLister: in Line 130 replace values 246, 2 and 220 with 214, 111 and 18. In Line 140 replace the value 155 with 254. Finally, in Line 50 replace the checksum 5998 with 5972.

As Lister and LLister were written, the new varieties of LIST and LLIST cannot concurrently be a part of BASIC's vocabulary. The new LIST and LLIST commands can be made to belong to BASIC's repertoire by making the following changes in Lister: in lines 10, 20 and 40 replace the number 240 with 179. Similarly, in lines 90, 100 and 130 replace 213 with 152. Then save the changed Lister on tape or disk.

When adding both the new LIST and LLIST commands to BASIC's vocabulary, you must LOAD and RUN LLister before doing the same with the changed Lister.

Some of you may be interested in further modifying LIST and LLIST to meet your own particular needs. Disassemblies of the machine language subroutines associated with Lister and LLister should prove helpful to you in making such modifications. Disassemblies of the slow LIST, no-scroll LIST and LLIST subroutines are presented in Tables 1, 2 and 3.

In the tables all numbers and addresses have been expressed in hexadecimal, so there is no need to use the symbol '\$' to indicate that a given number or address is in hexadecimal. The table addresses correspond to those used with a CoCo having a 16K byte RAM. For a 32K RAM mentally add 4000 hexadecimal to each of those addresses.

ADDRESS	HEX CODE	MNEMONIC	DPERAND	COMMENT
3FC3	34 7C	PSHS	UXYB, DP	;Save registers
3FC5	F6 02 DC	LDB	Ø2DC	;B is command token
3FC8	C1 9B	CMPB	#9B	;Is it LLIST token?
3FCA	27 Ø5	BEQ	3FD1	; If so, branch
3FCC	35 7C	PULS	UXYB, DP	Restore registers
3FCE	7E 88 89	JMP	0000	Exit set by POKEs
3FD1	30 BC 2A	LEAX	2A,PC	;X points to current
				character count
3FD4	81 ØD	CMPA	#ØD	; Is character
11.23				carriage return?
3FD6	27 22	BEQ	3FFA	; If so, branch
3FD8	E6 84	LDB	, X	;B is current
		900	1.0	character count
3FDA	26 10	BNE	3FEC	Branch if not start
UI UII	20 10	2115	U/ 20	of new line
3FDC	E6 #1	LDB	1, X	(B is margin size
3FDE	34 Ø6	PSHS	B, A	;Save margin size and
OI DC	01 00	1 0110	21	current character
3FEØ	E7 84	STB	, х	;Set character count
OI LE	L/ U4	315	1.0	to margin size
3FE2	86 20	LDA	#20	A is space
3FE4	BD A2 85	JSR	A285	;Line print space
3FE7	5A	DECB	H200	;Have all margin
JI'L'	on.	DECD		spaces been printed?
3FE8	26 FB	BNE	3FE2	;If not, loop
3FEA	35 06	PULS	B, A	Restore margin size
SPEH	22 80	ruca	Dyn	and current
				character
3FEC	50	INCB		Bump B
	C1 5Ø		#50	;Have all characters
3FED	C1 39	CMPB	#10	of current line
7555	27.44	DEC	7555	been printed?
3FEF	27 64	BEQ	3FF5	; If so, branch
3FF1	E7 84	STB	, X	;Save current
7000	00.07	200	7500	character count
3FF3	20 D7	BRA	3FCC	Prepare to exit
3FF5	BD A2 85	JSR	A285	;Line print final
22.00	21 22	1.52	0.00	character of line
3FF8	86 90	LDA	#ØD	;A is carriage return
3FFA	6F 84	CLR	, X	¡Zero character count
3FFC	2Ø CE	BRA	3FCC	Prepare to exit
3FFE	69			;Current character
2552				count
3FFF	00			;Margin size
		Tabl		
		I o h		



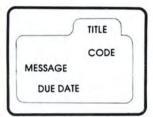




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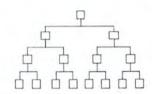
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# Like Sands Through The Hourglass

By Mary Crooks



fourglass is a short graphics routine for visual entertainment. It fills a time delay or visual gap in the on-screen proceedings. You can use it as a subroutine in programs you create that need such a time filler. If you add it to the "20 Odd-Ball Screen Rou-

(Mary Crooks, a housewife and mother of two, has been programming for about a year. She is currently helping to organize and run the computer center at her son's elementary school. She holds a degree in art and enjoys all things creative.)

tines" by Gregory Clark in THE RAIN-BOW, Jan. 1984, then you will have quite a collection from which to choose.

A Color Computer 16K Extended BASIC is required. Type RUN and the program writes the words "Please Wait" on the screen, then draws an hourglass. The sand in the hourglass falls for an interval of time that you can change to fit your needs. Lines 10-20 reserve memory for variables and determine the graphics mode. Lines 30-110 draw the cursive letters and assign them a variable name. The actual drawing of the words happens in Line 120 using DRAW and concatenation (adding together) of the variables. The rest of the program constructs and colors the hourglass and creates the falling sand particles. The time delay is for ten seconds. You can change the timing interval in Line 230 by increasing or decreasing the 50 in the FOR NEXT loop.

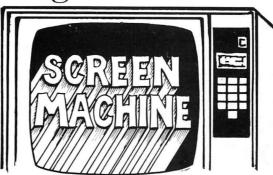
If you use Hourglass as a subroutine, include CLEAR 350 at the start of your main program and delete it from the subroutine. Call the subroutine with a GOSUB from the place in your program that it is needed, then change Line 260 to read RETURN.

#### The listing:

- 10 CLEAR 350
- 20 PMODE4, 1: PCLS: SCREEN 1,0
- 30 AP\$="EU2UNHNUER2FDGL2HBD3BR4"
- 4Ø BL\$="BRRE2U3HGD4FR"
- 5Ø BE\$="RE2HGF2R"
- 6Ø BA\$="RU2ERFDNFGLHBDBR4"
- 7Ø BS\$="REU2F2GNHR2"
- 80 AW\$="BU5FD3FENU4FEU3EBD5"
- 9Ø BI\$="REU2BUNEBD3DRBR"
- 100 BT\$="REU3NL2NR2NUBD3FR"
- 110 SS\$="BR5" SPACE
- 120 DRAW"S8BM20, 20"+AF\$+BL\$+BE\$+
- BA\$+BS\$+BE\$+SS\$+AW\$+BA\$+BI\$+BT\$+
- SS\$
- 13Ø CIRCLE(126,6Ø),3Ø,,.25

- 14Ø CIRCLE(126,152),3Ø,,.25
- 150 LINE (96,60) (156,152), PSET
- 160 LINE(156,60)-(96,152), PSET
- 17Ø LINE(116,9Ø)-(136,9Ø), PSET
- 18Ø PAINT(118,91),1,1
- 190 PAINT (126, 152), 1, 1
- 200 FOR Q=1TO 3
- 21Ø FOR T=1 TO 4Ø
- 22Ø P=124+RND(4):Q=11Ø+RND(26)
- 230 PSET(P.Q.1):FOR L=1TO 50:NEX
- 240 NEXT T:CIRCLE(126,152),15,...
- 75,.5Ø,1:PAINT(126,143),1,1
- 250 NEXT Q:CIRCLE(126,152),19,,.
- 75,.5Ø,1:PAINT(126,14Ø),1,1
- 26Ø FORX=1T02ØØØ:NEXT

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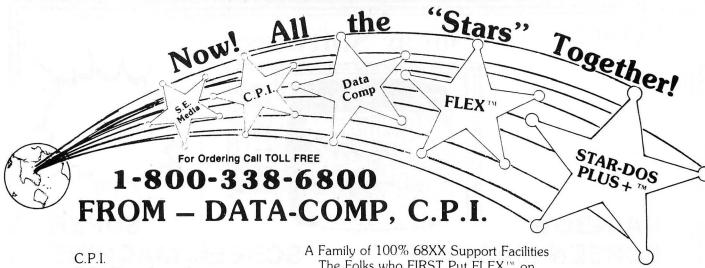
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# A Practical Alternative For Creating A Pupil Database

By Michael Plog Ph.D. Rainbow Contributing Editor

ecently, I had a chance to talk with some school people about using a pupil database. These people were directors of a program operating in schools, and needed to supply information to funding agencies (state education agencies, Federal grant agencies, or even foundations and industries). The funding agencies request information about each student being served with the money provided. Thus, the pupil database is a set of information wherein each student represents one record. Specific data elements may include such things as birth date, grade level, sex, scores on tests, date of entering the program, length of service by program personnel, and so on.

A pupil database is ideally suited for a microcomputer. There is the need to store information, have access to that information for updating, and prepare a report to be delivered to the funding agency. In this article, we will consider some of the features of a pupil database, and some of the uses.

With many commercial databases on the market, there is no need for local programmers to try to write their own database. Local efforts will probably not be as flexible as commercial programs, and will have to go through a long period of debugging. The time required to prepare a complete database program is probably not worth the amount of money required to buy one of several excellent products. I have no idea how many database packages are available for the Color Computer, but I have seen some in operation. With the power available for the low price, it is silly for local people to try to write their own. Thus, it is suggested that school personnel buy a commercial product; one that fits their needs and is easily understood.

When designing the database, and determining what information to store, include more than the minimum required by the funding agency. Consider what will be needed for local school use, in addition to what the outside agency will need. Such things as parents' names, address, telephone number, grades in classes, etc., are of local concern, but generally not of concern

to funding agencies. Design the database carefully. Remember, it will be impossible to get anything out of the pupil database that has not been put in.

Getting information out of a database may prove more complex than most people think. To get local reports from a database, the commercial reporting formats may work fine. However, the report to the funding agency may be a different matter, and after all, what is the sense of storing information on a microcomputer if you cannot have the machine prepare the reports for you?

Most funding agencies now use computer printer paper for student reports. After all, they have to enter the information they receive (typically on a mainframe), and simply use what is convenient. The trouble is that most of these forms will not be appropriate for commercial database report formats. Such things as the name of the school district may have to be printed on each page. Line spacing may prove to be a difficulty. Summary calculations may be required. Judging from the student reports I have seen, commercial database report formats are inadequate for the job.

The best solution to having the microcomputer print the necessary

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

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reports is to write a program to take the data from storage, format it in the required manner, and print it directly to the forms provided by the funding agency. If the records are stored in ASCII format, a BASIC program will solve this problem easily.

But there is the rub. Most program directors would find that hard to do. Few would have the time necessary to write such a program in BASIC. Even if program directors had the time, few have the background in programming. Generally, their training has not included a study of computer languages. Naturally, there will not be a major inclination to learn BASIC just for this purpose.

Hiring professional programmers is expensive. And while I have nothing against people selling their programming skills (I have done so myself), it must be recognized that many schools simply cannot afford the luxury of contracting with a programmer for what may well be a small program affecting only a few students. What is needed is inexpensive

"It seems an entirely workable idea to have students put classroom experiences to use on a real life problem."

programmers. (I refuse to say cheap programmers, because that implies low quality.)

There is a solution which makes this difficulty minor. Why not use students in school taking computer classes? The majority of schools in the country are teaching classes in BASIC. Students in these courses are learning a great deal about programming, and even writing programs that get published in magazines such as THE RAINBOW. The instructors of these courses are right in the buildings with the projects needing assistance from microcomputers. And of course, the price is right.

It seems an entirely workable idea to approach the instructor of a computer course with the idea of having the students put their classroom experiences to use on a real life problem. This would not only help the local district (getting reports in on time), but would give the students a chance to show their creativity, and progress beyond the typical exercises and activities of the classroom. The task would provide an excellent opportunity for the more advanced students in the computer course, but

would also be appropriate as a project for the entire class.

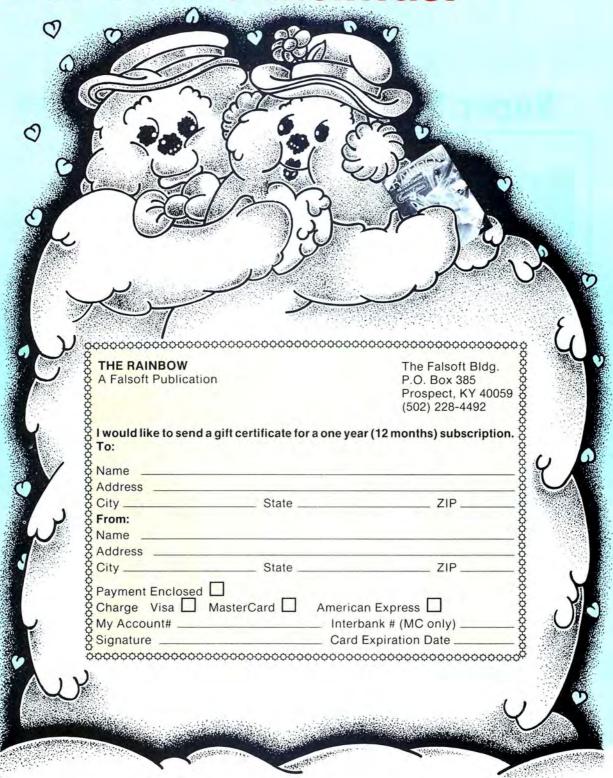
I realize that most readers of this article are not going to be program directors in need of microcomputer assistance. A more likely audience will be instructors of the computer classes. Well, go ahead — take the initiative. If you think your class could accomplish this type of activity, seek out those directors and coordinators of programs that might benefit from such a program. They will not be hard to find. Such folks are involved in things like special education, bilingual, chapter I, vocational programs, or in Federal programs funded directly to schools. Sometimes foundations and large industrial firms will fund special programs in schools.

The point of this suggestion is to advance and expand the use of microcomputers in schools. This is perhaps a non-traditional use of the microcomputer, and certainly a non-traditional use of microcomputer courses. But the cooperation that results cannot be anything but helpful — to students, teachers, program directors, and the school system itself.

Another thought about the database concept needs to be mentioned. The initial data load can be a problem, much more so than simply updating information already stored. Most school systems do not have enough secretarial help to keep up with the daily tasks that have to be done, much less take the time to load a host of student information into a microcomputer. What is needed is an inexpensive source of typing labor. Since we are using inexpensive programmers, why not continue the same idea here. Approach the typing teacher. I would imagine most teachers would appreciate the opportunity to have their students gain experience with a different keyboard, learn something about data entry, and get some practice on an activity that has immediate value.

So, it should be possible to use the microcomputer to further the cause of cooperation in schools, provide services that would not be available otherwise, and broaden the potential uses of modern technology in education. Not a bad deal. If anyone is currently engaged in such an activity, please let me know. If anyone starts something like this, I would appreciate knowing about it. My address is 829 Evergreen, Chatham, IL 62629. Until next month, take care and keep learning.

It'sno job to give the perfect gift for this Christmas.

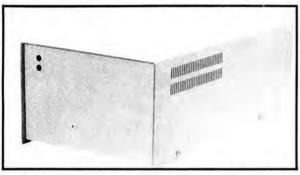


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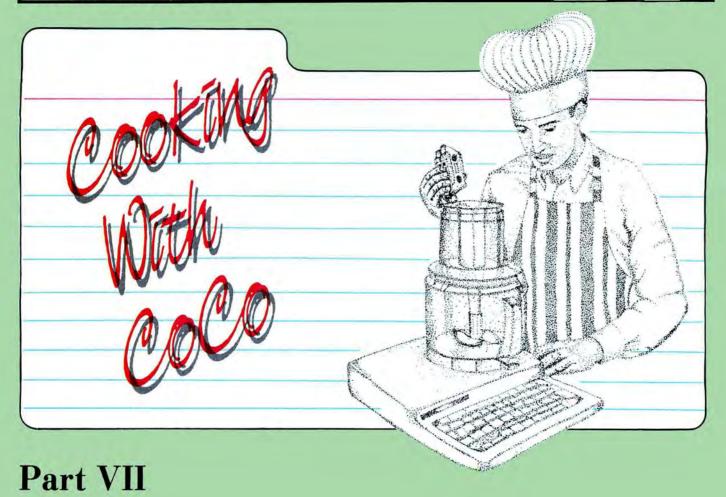
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By Colin J. Stearman

Teaching CoCo how to clean up after its errors and own up to mistakes

Probably the most frustrating limitation of the Microsoft BASIC in CoCo is its lack of ability to trap errors. Even the best written programs generate errors and when they do, it's infuriating to have CoCo tell you how you messed up and then tell you with a condescending smirk that it's OK! It isn't OK, so we must do something about it.

#### **Error Trapping**

Most flavors of BASIC have a statement similar to ON ERROR GOTO nnn which tells the interpreter that if an error occurs jump to line 'nnn' and continue running. Then at line 'nnn' we can write some lines which handle the error and continue the running of the program.

Because ON is already a BASIC keyword I decided to simplify the syntax. So here is a description of the error trapping command and some associated variables.

#### ERRORS

The syntax for the error directing line is ERRORS GOTO nnn, where 'nnn' is an existing line number or zero. When such a line is encountered in your program it simply tells the interpreter that, should an error occur, go to line 'nnn'. This command will stay in effect until another such line is encountered saying go to a different line on an error. Except if 'nnn' is a zero, error trapping is canceled and errors cause BASIC to stop the program and report just as before (or nearly as before, as you will see).

If line 'nnn' does not exist, then a 'No such line number' error will occur if the statement is entered in the direct mode. However, if it is in a program, it will create an error itself, but the error will have nowhere to go, and the program will lock up. Pressing Reset is the only option left.

Because the line number follows a normal GOTO statement, the RENUM

(Colin J. Stearman is an electronics engineer educated in the U.K. He has worked with all kinds of computers and has been a CoCo enthusiast for over two years.)

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command will handle it correctly.

When any error occurs all FOR... NEXT loops and subroutine return addresses are canceled, allowing the error handling routine to jump to anywhere in the program without a problem.

#### **ECODE**

This numeric variable returns the current error code number. If no error has yet been encountered, it will have the value -1, so if a NO SUCH FILE error was the most recent error, then doing a PRINT ECODE would print 26, the code number for that error. ECODE may be used just as any other numeric variable, but it may not be assigned a value by putting it on the left of an equal sign.

#### **ELINE**

This is also a numeric variable and all comments about ECODE apply equally to it. This returns the BASIC line number on which the most recent error occurred. If no error has yet occurred this variable will have the value of -1.

#### **ENAMES**

This is a string variable which contains the name of the most recent error. If no errors have yet occurred, ENAME\$ is a zero length string. All normal string manipulation functions may use it, but it too must not appear on the left of an equal sign.

The error code numbers returned by ECODE and the associated error strings are:

<b>ECODE</b>	ENAMES
0	NEXT without FOR
1	Syntax
2	Return without GOSUB
3	Out of Data
2 3 4	Function Call
5	Overflow
6	Out of Memory
7	No such line #
8	Subscript
9	Redimensioned Array
10	Divide by 0
11	Illegal Direct Command
12	Type Mismatch
13	Out of String Space
14	String too long
15	String too complex
16	Can't Continue
17	File Data
18	Already Open
19	Device Number
20	Read/Write
21	File Mode
22	File Not Open
23	Read past End of File

24	Direct Command in File
25	Undefined Function
26	No such File
27	Record #
28	Disk Full
29	Out of Buffer Space
30	Write Protect
31	File Name
32	Directory
33	File Exists
34	Field Overflow
35	Set to Non-Fielded String
36	Verify

If no error trapping is set, BASIC will return these fully spelled out error messages followed by the word ERR-OR, instead of the cryptic question mark and two letter code.

Access past End of File

Due to memory space limitations, ENAME\$ and fully spelled out error messages are not included in the patch to *DECB 1.1*.

#### **SWAP**

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The final BASIC command to be added is SWAP. This has no connection with error trapping but is useful to have around. The syntax is: SWAP var1, var2

"When any error occurs all FOR...NEXT loops and subroutine return addresses are canceled, allowing the error handling routine to jump to anywhere in the program without a problem . . . If no error trapping is set, BASIC will return these fully spelled out error messages followed by the word ERROR, instead of the cryptic question mark and two letter code."

where 'varl' and 'var2' are like variables. This means that SWAP A\$,B\$ will cause the string associated with A\$ to be assigned to B\$ and vice versa. Similarly, SWAP DL, WP will cause the value assigned to DL to be assigned to WP and that of WP to be assigned to DL. If the two variables are not of the same type, (string or numeric) then a 'Type Mismatch' will occur.

The SWAP command saves the need for an intermediate holding variable when exchanging variable values and is considerably faster than this approach. The obvious application is in 'bubble sorts' where elements must be swapped.

#### A Final Flourish

If you look at Listing 1 around the label RESET you will notice some additional start-up codes. This executes when CoCo does a cold start. The first thing this code does is restore all the drives to track 0. This eliminates that annoying search up and down the disk during the first disk access. The slight increase in start-up time is worth the subsequent savings in access time and reduction in wear and tear on the drive itself, not to mention your nerves!

This code restores all possible drives to track 0. If you do not have four drives you can improve the start-up time a little by only restoring the drives you do have. This is done by changing the '3' in the line immediately after the line defining RESET (which reads 'LDB #3 NUMBER OF DRIVES') to one less than the number of drives you do have.

#### Adding This Month's Code

Just as in previous months, pull the assembly file built up so far into your editor, then remove the commenting asterisks from the start of line with [REF #] of 2, 9-1, 9-2 and 9-3. Completely delete reference lines 18, 19, 25, 26 and 27. Also delete all lines at the end starting with 'ZZLAST EQU \*-1'.

Now type in the new code found in Listing 1 and reassemble the result. As this month's addition is the last, rename the composite assembly language source as DISKPTCH.ASM and the binary file as DISKPTCH.BIN. Test the binary patch file just as you have for the past few months.

#### Wrapping It Up Next Month

The next issue of THE RAINBOW will see the last installment of this series. In it we will tie up a few loose ends; put the entire revised version of Disk BASIC in an EPROM and mount it in the disk controller, and make some suggestions for commands you could add yourself. I hope you'll plan on joining me then.

If you would like the entire DOS-PATCH program source, along with binary files with and without the parallel port driver for DECB 1.0 and DECB 1.1, just send me a disk (no cassettes please) along with \$6 and a stamped, addressed disk mailer. I will load the disk and return it to you promptly.

Address this request or any questions to: Colin Stearman, 143 Ash Street, Hopkinton, MA 01748.

The	listing:								
		1987		OPT	LIS				
		1988	******	****	********	**********			
		1089	* PATO	CH #4	to RSDOS (C	C)1984 Colin Stearman *			
		1898	*****	****	********	******			
		1891	+						
		1892	* "BAUI	" CON	MAND CODE				
			93 * SYNTAX IS BAUD(N) WHERE N =						
		100.0070			88,2488,486				
		1895	,	,		,			
DC62 B	BE	77.00	BDCNST	FCB	\$BE.\$57.\$2	29,\$12,\$6,\$1 300,600,1200,2400			
	_	1897				80,9600 BAUD CONSTANTS			
		1898	*			, constant and a second			
		1899							
DC48 I	3DB262	1100	BAUD	JSR	\$8262	EVAL BRKT ARGUMENT			
DC6B	BDB748	1101		JSR	\$B740	GET INTEGER IN X			
DC6E	SFE2	1102		CLR	,-S	FOR COUNTER			
DC7#	1F10	1103		TFR	X,D	GET BAUD VALUE			
DC72	#83258#	1184		CMPD	#9600	HIGHEST LEGAL VALUE			
DC76	1 <b>0</b> 22FBBF	1105		LBHI	FCERR	ERROR IF HIGHER			
DC7A	SCE4	1186	CNTBD	INC	, S	COUNT SUBTRACTION			
DC7C	83Ø12C	1187		SUBD	#300	DIVIDE BAUD BY 300			
DC7F	1#2BFBB6	1198		LBMI	FCERR	NOT A VALID VALUE			
DC83	26F5	1109		BNE	CNTBD	CONTINUE SUBTRACTION			
		1110	* GOT 6	VALI	D MULTIPLE	OF 300			
DC85	3502	1111		PULS	A	GET RESULT			
DC87	5F	1112		CLRB		POWER COUNTER			
DC88	BEDC62	1113		LDX	#BDCNST	POINT X TO BAUD CONSTANTS			
DC8B	44	1114	SFTAGN	LSRA		BIT INTO CARRY			
DC8C	25#3	1115		BCS	GETCON	GOT BIT GET CONSTANT			
DC8E	5C	1116		INCB		COUNT SHIFT			
DC8F	2ØFA	1117		BRA	SFTAGN	GO SHIFT AGAIN			
DC91	A685	1118	GETCON	LDA	В, Х	GET BAUD RATE			
DC93	9796	1119		STA	BAUDRT	SET BAUD RATE			
DC95	8F95	1120		CLR	BDFLAG	CLEAR TO ENABLE SERIAL PORT			
		1121	+		AND	SET LSB OF BAUD RATE			
		1122	*						
DC97	39	1123		RTS		ALL DONE			
		1124	*****	*****	********	******			

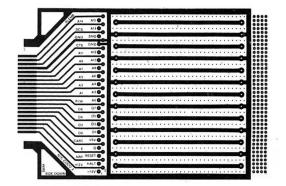
```
DATEBOOK & CALENDAR
"Tape or Disk files
«»Index records by date.
month, year, or day
∞Prints date-to-date
"Encryption by Password,
password is not stored
32 k E C B
                         $ 25,95
RELATIONAL DATABASE
Blistering fast sort, 1000
records in 10 sec OR LESS!
... Multikey sort
*Tape or Disk files
"Math ability
   SASE for more info
32 k ECB
                         $39,95
Butterfly Software
Rt 7 Box 565-A
                      (8 \ 0 \ 6)
Lubbock, Tx 79401
                       762-1941
```

```
1125 *
                        "LDIR" COMMAND, PRINT DIRECTORY
               1126 #
DC98 CAFE
               1127 LDIR
                          LDB
                                 #-2
                                            POINT DEVNIM TO PRINTER
DC9A D76F
               1128
                                 DEVNIIN
                           STR
DC9C 7EC8CF
               1129
                          JMP
                                 A##16
                                            DO DIR COMMAND
               1130 *****************************
               1131
                          IEDE PARPRI
                                            ASSEMBLE FOR PARALLEL PORT
               1132 #
               1133 * "PARALLEL" COMMAND CODE AND OUTPUT ROUTINE
DC9F CC01CA
               1134 PARA LDD
                                #$1CA
                                            120 BAUD DELAY
               1135 *
                                       SET MSB TO 1 FOR PARALLEL PORT
DCA2 DD95
               1136
                           STD
                                 BDFLAG
                                            TO MAKE PARALLEL ACTIVE
DCA4 39
               1137
                          RIS
               1138 *******
               1139 * Parallel port output routine
               1140 * This is called by the modified jump at $168
DCA5 0095
               1141 PAROUT TST BDFLAG
                                            IF NOT ZERO THEN PARALLEL
DCA7 1027EE9F
               1142
                          LBEQ ABB15
                                            DO SERIAL OUTPUT
DCAB 3402
                           PSHS A
               1143
                                            SAVE VALUE
DCAD 966F
               1144
                           LDA
                                DEVNUM
                                            GOING TO DEVICE -2?
DCAF BIFE
               1145
                           CMPA #-2
DCB1 35#2
               1146
                           PULS A
                                             RECOVER CHAR, FLAGS DONT CHANGE
DCB3 1#26EE93
              1147
                           LBNE A0015
                                             NOT DOING DEVICE #-2
               1148 +
               1149 * PARALLEL OUTPUT WANTED
DC87 8160
               1150
                           CMPA #$ØD
                                             WAS IT A CR?
DCB9 2703
               1151
                           BED
                                 MASCR
DCBB ØC9C
               1152
                           INC
                                 ($90
                                             INCREMENT LINE PRINT POSITION
DCBD 8C
               1153
                           FCB . $8C
                                             SKIP NEXT 2 BYTES
DCRE GESC
               1154 WASCR CLR
                                 ($90
                                             LINE COUNTER
DCC# 3411
               1155
                           PSHS CC. X
                                             PRESERVE BASIC VALUES
DCC2 8EFF26
               1156
                           LDX #DATA
                                             POINT X TO PIA
               1157 CHKRDY TST
DCC5 AD1E
                                 -2.X
                                             BUSY IF LINE 7 HI
DCC7 2BFC
               1158
                           BMI
                                 CHKRDY
                                             WAIT UNTIL LOW
DCC9 A784
               1159
                           STA
                                             DATA REGISTER
                                 . X
DCCB 3511
               1140
                           PULS CC, X
                                             RECOVER VALUES
DCCD 3262
                           LEAS 2.S
               1161
                                             OLD RETURN OFF STACK
DCCF 39
               1162
                           RTS
                                             TO ORIGINAL CALLER
               1143 ********
               1164
                           ENDC
               1165
                           OPT 119
               1166 *******************************
               1167 * PATCH #5 to RSDOS (C)1984 Colin Stearman *
               1169 *
               1170 *************
               1171 * "SWAP"
               1172 *
               1173 * CODE FOR SWAP COMMAND SYNTAX IS SWAP V1, V2
               1174 * WHERE VI AND V2 ARE LIKE VARIABLE TYPES
               1175 *
DCD# BDB357
                                $B357
                                            GET FIRST STRING POINTER
               1176 SWAP
                          JSR
DCD3 9696
               1177
                                            TYPE G=NUMBER -1=STRING
                           LDA (6
DCD5 3412
               1178
                           PSHS X.A
                                            SAVE ON STACK
               1179
                                $B26D
                                            PARSE REQUIRED COMMA
DCD7 BDB26D
                           JSR
                               $8357
DCDA BDB357
               1180
                           JSR
                                            GET 2ND STRING POINTER IN X
               1181 * NOW TEST THAT BOTH VARIABLES ARE SAME TYPE
DCDD 35#2
               1182
                           PULS A
                                            RECOVER FIRST TYPE
DCDF 9106
               1183
                           CMPA (6
                                             CHECK FOR SAME AS SECOND
               1184 * NOT SAME TYPE SO ISSUE ?TM ERROR
DCE1 1826D46C
                           LBNE $8151
               1185
                                            TYPE MISMATCH
               1186 * SAME TYPE SO SWAP POINTER INFO
DCE5 3546
               1187
                           PULS U
                                            ONE IN X, OTHER IN U
DCE7 C685
                           LDB #5
               1188
                                            COUNTER
DCE9 A684
               1189 SWAP5
                          LDA
                                . X
                                            GET VALUE AT X
                           PSHS A
DCEB 3482
               1190
                                            PRESERVE IT
DCED A6C4
               1191
                           LDA
                               , υ
                                             GET VALUE AT U
DCEF A78Ø
               1192
                           STA
                                            PUT AT X
                                 , X+
DCF1 3502
                           PULS A
               1193
                                            GET ORIGINAL AT X
DCF3 A7CØ
               1194
                           STA
                                 , U+
                                            PUT AT U
DCF5 5A
               1195
                           DECB
                                             REDUCE COUNTER
DCF6 26F1
                           BNE SWAPS
               1196
                                            CONTINUE SWAPPING
DCF8 39
               1197
                           RTS
               1198 ********************
               1199 * "ERRORS" Command
               1200 * Executed when the ERRORS command is encountered
               1201 *
DCF9 C681
               1202 ERRCHD LDB
                                 #$81
                                            CHECK "GO"
                          JSR
DCFB BDB24F
               1263
                                 $826F
                                            NOT THEN SYNTAX ERROR
DCFE C&A5
               1264
                          LDR
                                ##A5
                                            CHECK "TO"
DD## BDB26F
               1205
                           JSR
                                 $826F
                                            NOT THEN SYNTAX ERROR
DDØ3 BDAF67
               1206
                          JSR
                                 $AF67
                                            PROCESS LINE # INTO $28
               1207
                          IDD
                                 ($2R
                                            GET THE LINE #
```

```
DD68 DDDC
                1248
                           STD
                                 JLINE
                                             SAVE IT
                1289 ** IF ZERO THEN CLEAR TRAPPING
DDØA 2773
               1210
                           BEQ ERRSET
                1211 ** CHECK FOR VALID LINE NUMBER
DDØC DCA6
                1212
                           LDD
                                 $A6
                                             GET PARSER POINTER
DD#E 3496
                1213
                            PSHS D
                                             SAVE ON STACK
DD16 BDAEA9
                1214
                           JSR
                                SAFA9
                                             CHECK VALID NUMBER
                1215 *IF WE GOT BACK HERE IT'S OK
DD13 3506
               1216
                           PULS D
                                             RESET PARSER POINTER
DD15 DDA6
                1217
                           STD
                                 $46
DD17 39
               1218
                           RTS
                1219 ******************
                1220 * ERROR TRAPPING AND HANDLING ROUTINE
                1221 *
                1222 * this code is executed when an error is
                1223 * encountered by BASIC from jump at $18F
                1224 #
                                             CURRENT LINE
DD18 BDD818
               1225 ERRTRP JSR
                                 DIRECT
                           REO
                                 NOTRAP
                                              SO DONT TRAP IT
DD1B 2724
                1226
DD1D 9EDC
                1227
                           LDX
                                 JLINE
                                             GET ERRLINE JUNP
DD1F 2720
                1228
                           BEQ
                                  NOTRAP
                                              SO DONT TRAP IT
                1229 *******
                1230 * WE WANT TO TRAP ERROR NOW B HAS ERROR CODE #2
                1231 * IF AN OD ERROR THEN THEN ADDRESS AT $28 NEEDS
               1232 * PUTTING AT $A6 BECAUSE READ MOVED IT TO SCAN
                1233 * THE DATA STATEMENTS
                1234 #
                1235
                            CMPB #$6
                                              OD ERROR NUMBER
DD21 C186
                                              NOT A OD FREDR
DD23 2684
                1236
                            BNE
                                  NOREAD
DD25 9E2B
                                              GET POINTER
                1237
                            LDX
                                  $2B
DD27 9FA6
                1238
                                  $A6
                                              PUT IT IN PARSER
                            STX
                1239 NOREAD LSRB
                                              DIVIDE RY 2
DD29 54
DD2A D75A
                1249
                            STB
                                  ECODE
                                              CODE ADDRESS
DD2C 9E68
                1241
                            LDX
                                  ($68
                                              CURRENT LINE
DD2F 9F76
                                  ELINE
                                              ERRLINE ADDRESS
                1242
                            STX
                                              GET ERROR GOTO LINE .
DD3# 9EDC
                1243
                            LDX
                                  JI INF
                                              PREPARE TO GO TO IT
DD32 9F2B
                1244
                            STX
                                  ($2B
DD34 18DE21
                1245
                            LDS
                                  ($21
                                              CLEAN STACK
                                              RETURN TO INTERPRET LOOP
                                  #$ADC4
DD37 CCADC4
                1246
                            LDD
DD3A 3486
                1247
                            PSHS
                                              PUT ONTO STACK
                                  D
                                              RESET DEVICE CODE
DD3C @F6F
                1248
                            CLR
                                  DEVNUN
DD3E 7EAEA9
                                  SAFA9
                                              GO TO NEW LINE
                1249
                            JMP
                1250 ****
                1251 *PROCESS NO TRAP
DD41 8D3C
                1252 NOTRAP BSR
                                  ERRSET
                                              RESET ERROR CODE
                1253 +
                            IFGT REV
                1254
                1255
                            JMP
                                  $AC49
                                                1 DOS 1.1 only
                            ENDC
                                               <----
                1256
                1257 4
9988
                1258
                            IFEQ REV
                       Process new error display :
                1259
DD43 BDD1E5
                1260
                            JSR
                                 A8826
                                              CLEAR DISK SYSTEM
DD46 3484
                                  В
                1261
                            PSHS
                                              PRESERVE ERROR CODE
DD48 BDCA3B
                                  A9914
                1262
                            JSR
                                              MORE DISK SHUTDOWN :
DD48 3584
                                              GET ERROR CODE BACK
                1263
                            PULS B
DD4D BDA7E9
                            JSR
                                  $A7E9
                                              MOTOR OFF. !
                1264
                                              RESET STACK ETC.
DD5# BDAD33
                1265
                            JSR
                                  $AD33
DD53 ØF6F
                                  DEVNUM
                                              REST TO SCREEN
                1266
                            CLR
                                              OUT RETURN IF NEEDED
DD55 BDB950
                1267
                            JSR
                                  $895C
                                              DIVIDE ERROR CODE BY 2 :
                            LSRR
DD58 54
                1268
DD59 8DØ6
                1269
                            BSR
                                 ERFIND
                                              FIND ERROR MESSAGE
                     * OUTPUT NEW ERROR MESSAGE
                1278
DD58 BD89A2
                            JSR
                                 STROUT
                                              OUTPUT IT :
                1271
                                              PRINT " ERROR" ETC. | DOS 1.0 only
DD5E 7EAC65
                1272
                            JMP
                                  $ACA5
                1273 ******* 1
                1274 * error message finder
                1275 * B has error count/2 coming in
                1276 * HAS CHARACTER COUNT COMING OUT
                1277 * X HAS POINTER TO FIRST CHAR !
                                              MOVE ERROR CODE TO A
DDA1 1598
                1278 FREIND TER
                                  B.A
                                              POINT X TO MSG ## . .
DD63 BEDDC5
                1279
                            LDX
                                  #ERRØ
                                              DONT AFFECT X FIRST TIME
                            CLRB
DD66 5F
                1289
DD67 3A
                1281 KPLONK ABX
                                              ADD COUNT TO ERROR ADDRESS
                                              GET CHARS IN MESSAGE
DD48 E488
                1282
                            LDB
                                  , X+
                                              DECREASE ERROR COUNT
                1283
DD6A 4A
                            DECA
DD6B 2AFA
                1284
                            BPL
                                  KPLOOK
                                              KEEP LOOKING
                                                1
                1285
                            RTS
DD6D 39
                                               (----
                 1286
                            ENDC
                1288 * CLEAR ERROR TRAPPING ON RUN
                1289 ERCNCL BSR ERRSET
 DDAE BDØF
```

_							
	0074	7EC998	1204		JMP	A9913	
	פועע	126710				########### HDD13	
							D START AND RESETS ALL
							ID RESETS ERROR TRAPPING
			1273	15000000000	3 10 1	WHEN TEND HE	NO RESELS ERROR INHEFTING
					. d=1	0-1 to trac	-k 2050
	DD 77	ØFEA		RESET		\$EA	RESTORE OPCODE =0
	DD75	20.200	1270	ושכשרו	LDB	*i	NUMBER OF DRIVES-1
		D7EB	1277			\$EB	DRIVE NUMBER
				HVTDDII			
	DD79			NXTDRV	-		DO RESTORE TO TRACK # WITH 1 RETRY
	DD78		1300			\$EB	NEXT DRIVE
	DD7D	ZAFA	1301		RLL	NXTDRV	
			1302				
			1303				
					s ERRO	OR trapping	
			1305				
	DD7F			ERRSET			SAVE REGS
		9E8A	1307			ZERO	
	DD83	9FDC	1308		STX	JLINE	
		CCFFFF	1309			#\$FFFF	
	DD88		1310		STD		
	DD8A	975A	1311		STA	ECODE	
	DD8C	3516	1312		PULS	D, X	RECOVER REGS
	DD8E	39	1313		RTS		
			1314	******	++		
			1315	* resto	ore dri	ive head with	n no retries
	DD8F	3476	1316	HOME	PSHS	A, B, X, Y, U	
	DD91	8681	1317		LDA	#1	RETRY COUNT 1= NO RETRIES
	DD93	7ED678	1318		JMP	A0832	RESTORE CODE ENDS WITH AN RTS
			1319	*****	*****	*********	********
			1320	*			
			1321	*	"ELI	NE "	
			1322	*			
	DD96	DC76	1323	ERRLIN	LDD	ELINE	
		1#83FFFF	1324		100000	#\$FFFF	IF \$FFFF NOT SET?
		1#26FEBD	1325			UNSIGN	YES IT IS
		7EB4F4		SIGNED		\$B4F4	RETURN AS SIGNED VALUE (-1)
	20110					*********	HETENNING GIGNED THESE \ 17
			1328				
				-			

#### 6809 SYSTEM DEVELOPMENT



#### EXPANSION HARDWARE FOR THE TRS-80 COLOR COMPUTER

#### XPNDR1"

#### Super Guide™

We've added grounding tabs to the XPNDR1 and, on the outboard end, an array of platedthrough solder pads. Shown is the bottom side of the card with the CoCo signals identified and the +5V and ground buses. The edge connector and tabs are gold plated: the 4.3×6.3 inch glass/ epoxy card is drilled for standard .3 and .6 inch DIP sockets. Includes 8 page Application Notes to help you get started.

\$19.95 each or 2 for \$36

Precision molded plastic insert designed specifically to align and support printed circuit cards in the CoCo cartridge slot: an unbreakable removable card quide. Patent Pending.

**\$3.95** each

Available now from:



		1329	*	"ECO	DE*	
		1339				
DDA3 4	F		ERRCOD	CLRA		
DDA4 I		1332		LDB	ECODE	
		1333	*IF MIN	US TH	EN IT IS -1	AND THEREFORE UNSET
DDA6	192AFEB3	1334		LBPL	UNSIGN	OUTPUT UNSIGNED # TO VARIABLE
DDAA 1	D	1335		SEX		MAKE D HAVE VALUE IN B
DDAB 2	2#F3	1336		BRA	SIGNED	OUTPUT TO VARIABLE (-1)
		1337	*****	*****	*********	***
8888		1338		IFEQ	REV	<
		1339	*	ENAM	E\$ }	
DDAD I	065A	1348	ERNAME	LDB	ECODE	GET ERROR CODE :
DDAF 2	2A#2	1341		BPL	GETNM	GET ERROR NAME STRING !
DDB1 5	5F	1342		CLRB		FOR NULL STRING LENGTH !
DDB2 A	1	1343		FCB	\$A1	SKIP NEXT INSTRUCTION
			* !			
DDB3 B	DDD61		GETNM	JSR	ERFIND	RETURNS X AT ERROR NAME :
		1346			A. 100	TH COUNT 1
DDB6 1	F13	1347		TFR	X,U	SAVE ERROR STRING POINTER
DDB8 B	BDB5#F	1348		JSR	\$B50F	
			*X NOM		TRING START	
DDBB 2		1350		BEB	STREXT	NULL LENGTH STRING :
DDBD 1	E13	1351		EXG	X,U	SWAP THE POINTERS !
	BDA59A	1352			\$A59A	MOVE STRING !
DDC2 7	EB69B	1353	STREXT	JMP	\$B69B	RETURN VIA STRINGS CODE !
				*****	********	******************
		1355			02700040000	
				R MESS	AGES !	
			* !	con occur-		
				AT IS	CHARACTER (	COUNT/CHARACTERS :
		1359				
DDC5 1		1369	ERRØ	FCB	ERR1-(*+1)	
DDC6 4		1361		FCC		HOUT FOR/ !
DDD6 6		1362	ERRI	FCB	ERR2-(++1)	
0007 5		1363			/SYNTAX/	
BDDD 1			ERR2	FCB	ERR3-(++1)	
DDDE 5		1365				ITHOUT GOSUB/ :
DDF2 £			ERR3		ERR4-(#+1)	
DDF3	\$F	1367		FCC	/OUT OF D	ATA/ I

#### **RAINBOW SCREEN MACHINE**

The Rolls Royce of graphics text screen enhance 5-more features than all others combined.

#### Tape \$29.95: Disk \$32.95

#### SUPER SCREEN MACHINE

Revolutionary — Heralded as the most useful, powerful and versatile state-of-the-art utility ever developed for the Color Computer.

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3. A/R	\$59.95	7. Budget	\$ 49.95
4. Payroll	\$79.95	8 Master 1-7	\$200.05

We carry DFS forms to run with our software. These forms are compatible with over 385 software companies.

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Send 3.00 for shipping and handling for free catalog and product information.

Postage paid on all orders. To receive **Free** catalogue & product information send \$3.00 to cover shipping & handling.

```
DDFF 4D
                1368 ERR4
                            FCB
                                   ERR5-(#+1)
                                   /FUNCTION CALL/
DDFF 46
                1369
                            FCC
DESC 88
                137# ERR5
                                   ERR6-(#+1)
DEED AF
                1371
                             FCC
                                   /OVERFLOW/
                1372 FRRA
                                   FRR7-(#+1)
DE15 4D
                            FCB
DE16 4F
                1373
                             FCC
                                   /OUT OF MEMORY/
DE23 SE
                1374 ERR7
                                   ERR8-(*+1)
                            FCB
                1375
                             FCC
                                   /NO SUCH LINE #/
DE24 4E
DE32 69
                1376 ERR8
                            FCR
                                   FRR9-(#+1)
DE33 53
                 1377
                             FCC
                                   /SUBSCRIPT/
DE3C 13
                1378 ERR9
                            FCB
                                   ERR18-(++1)
                                   /REDIMENSIONED ARRAY/
DE3D 52
                1379
                             ELL
DE5# #B
                138# ERR1#
                                   ERR11-(++1)
                            FCB
DE51 44
                1381
                             FCC
                                   /DIVIDE BY #/
                 1382 ERR11 FCB
DESC 1A
                                   ERR12-(#+1)
DE5D 49
                1383
                             FCC
                                   /ILLEGAL DIRECT COMMAND/
DE73 ØD
                1384 ERR12 FCB
                                   ERR13-(#+1)
DE74 54
                 1385
                             FCC
                                   /TYPE MISMATCH/
DE81 13
                 1386 ERR13
                            FCB
                                   ERR14-(++1)
DE82 4F
                 1387
                             FCC
                                   /OUT OF STRING SPACE/
DE 95 8F
                 1388 FRR14
                            FCB
                                   FRR15-(#+1)
DE96 53
                1389
                             FCC
                                   /STRING TOO LONG/
DEA5 12
                 139# ERR15
                            FCB
                                   ERR16-(*+1)
DEA6 53
                1391
                             FCC
                                   /STRING TOO COMPLEX/
DEB8 ØE
                                   ERR17-(++1)
                 1392 ERR16
                            FCB
DER9 43
                1393
                            FCC
                                   /CAN'T CONTINUE/
DEC7 #9
                 1394 ERR17
                            FCB
                                   ERR18-(#+1)
                                                       DOS 1.8 only
DECS 46
                1395
                             FCC
                                   /FILE DATA/
DED1 AC
                1396 FRR18
                            FCB
                                   ERR19-(++1)
DED2 41
                1397
                             FCC
                                   /ALREADY OPEN/
DEDE ØD
                 1398 ERR19
                            FCB
                                   ERR28-(#+1)
DEDE 44
                                   /DEVICE NUMBER/
                1399
                            FCC
DEEC GA
                 1466 FRR26
                            FCR
                                   ERR21-(++1)
DEED 52
                                   %READ/WRITE%
                1481
                             FCC
DEF7 #9
                1482 ERR21 FCB
                                   ERR22-(++1)
DEFR 46
                1463
                             FCC
                                   /FILE MODE/
DF#1 #D
                 1464 ERR22
                            FCB
                                   ERR23-(++1)
DF#2 46
                1465
                                   /FILE NOT OPEN/
                             FCC
DESE 15
                 1484 FRR23
                            FCR
                                   ERR24-(#+1)
DF1# 52
                1467
                             FCC
                                   /READ PAST END OF FILE/
DF25 16
                1468 ERR24
                            FCB
                                   ERR25-(*+1)
DF26 44
                1469
                             FCC
                                   /DIRECT COMMAND IN FILE/
DE3C 12
                 141# ERR25
                            FCB
                                   ERR26-(++1)
DF3D 55
                1411
                             FCC
                                   /UNDEFINED FUNCTION/
DF4F ØC
                 1412 ERR26
                            FCB
                                   FRR27-(++1)
DF5# 4E
                1413
                             FCC
                                   /NO SUCH FILE/
DF5C #8
                 1414 ERR27
                            FCB
                                   ERR28-(#+1)
DE50 52
                1415
                             FCC
                                   /RECORD #/
DF 65 69
                1416 ERR28
                            FCB
                                   ERR29-(++1)
DF66 44
                1417
                                   /DISK FULL/
DF6F 13
                 1418 ERR29
                            FCB
                                   ERR36-(#+1)
DF76 4F
                1419
                             FCC
                                   /OUT OF BUFFER SPACE/
DER3 AD
                 1428 ERR38
                            FCB
                                   ERR31-(#+1)
DF84 57
                1421
                             FCC
                                   /WRITE PROTECT/
DF91 89
                 1422 ERR31
                            FCB
                                   ERR32-(++1)
DF92 46
                1423
                             FCC
                                   /FILE NAME/
DESR 49
                 1424 ERR32
                            FCB
                                   ERR33-(#+1)
DF9C 44
                1425
                             FCC
                                   /DIRECTORY/
DFA5 ØB
                1426 ERR33
                            FCB
                                   ERR34-(#+1)
DEA6 46
                1427
                             FCC
                                   /FILE EXISTS/
DFB1 BE
                 1428 ERR34 FCB
                                   ERR35-(#+1)
DFB2 46
                1429
                             FCC
                                   /FIELD OVERFLOW/
DECA 19
                1438 ERR35 FCB
                                   ERR36-(#+1)
DFC1 53
                1431
                             FCC
                                   /SET TO NON-FIELDED STRING/
DEDA 66
                1432 ERR36 FCB
                                   ERR37-(#+1)
DEDB 56
                1433
                            FCC
                                   /VERIFY/ !
DFE1 17
                1434 ERR37
                            FCB
                                   ENDERR-(#+1)
DFE2 41
                1435
                            FCC
                                   /ACCESS PAST END OF FILE/ :
                1436 ENDERR EQU
                1437
                            ENDC
                1438
                1439
DFF8
                1446 77LAST FRU #-1
                                               last used address value
                1441 #
                1442 * ZZLAST must not be greater than *DFFF for
                1443 * DOS 1.8 and $DEFF for DOS 1.1. The latter
                1444 * has the OS-9 Boot program and SWI set routines
                1445 * from $DF## to $DF4C
                1446 *
                1447 *
                1456
                            OPT
                                  LIS
D994
                1457
                            END
                                   ADDCOM
```

## **'HOME COMMANDER'** \$49.95





#### CONTROL YOUR WORLD

Give yourself piece of mind while on vacation by programming the HOME COMMANDER to control lamps, radios, TVs and more. Or make life easy on yourself by turning on the coffee pot before you wake up. You can do this and more with the HOME COMMANDER.

#### no wires necessary

The HOME COMMANDER uses your home's existing electrical wiring to control virtually anything. Appliances are controlled via small control modules (sold separately). The LAMP DIMMER MODULE allows you to turn a lamp on or off and control 16 brightness levels. The APPLIANCE MODULE is used to control appliances up to 400 watts such as a TV, radio, stereo system, fan or motor.



#### ON FRIDAY 7:42 PM, OFF SUNDAY 1:26 AM

Included FREE is a program to allow you to control up to 256 devices and specify the time and date they are to be activated. That's right, the software has its own built in accurate clock. LAMP DIMMER MODULE \$16.95 APPLIANCE MODULE \$16.95

#### PRECISION TIME MODULE NEW!



Now your computer will always know the correct time and date. This amazing precision time module is calibrated to the National Bureau of Standards (WWV) atomic clock and you should never have to change it. Use the PRECISION TIME MODULE to add the time element to your game. Or use on your BBS so that the time will always be perfectly accurate.

#### BATTERY BACKUP

Even when your computer is off, the clock keeps correct time by operating using the internal battery backup system.



#### MONTHS, LEAP YEARS & DST

The PRECISON TIME MODULE automatically adjusts for the different number of days in each month as well as leap years. And believe it or not, it adjusts for DST so you don't have to remember if it's SPRING FORWARD or FALL FORWARD.



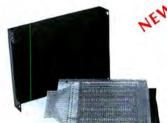
#### Y-CABLE

Why pay \$100 to \$200 for a multi-pak. With the Y-CABLE, you can connect your disk system to your computer along with either our STEREO PAK music synthesizer, our VOICE, SUPER VOICE speech synthesizers, or our PRECISION TIME MODULE. All connectors gold plated.



Need an

SC-01? \$29.00



## LEN' ATTENTION EXPERIMENTERS!

Interested in building your own project? Our oversized board gives plenty of room

for construction while the sturdy aluminum case with black satin finish assures protection and a professional appearance.

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Disks (any quan	tity)	\$1.49
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# Speech Systems

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# MEN' MUSICA 2

Tape \$34.95 Disk \$39.95

- High resolution graphic display, looks just like sheet music.
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.

 Billions of timbre combinations.

S. Commissions

S. Commissions

Electronic Commissions

P. Com

Star

Output your music to any dot matrix printer (Gemini 10X, Epson, R.S. printers, Okidata, etc.)

Offer ends Jan. 15 \$29.95

Tape or Disk

 When in stereo mode, music is played through our STEREO PAK (purchased separately).



Repeat bars allow repeating of music without re-inserting music a second or third time.

 Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.

 During editing, voice being inserted is displayed.

 Each measure is numbered for easy reading of music.

 Measure bars aid in reading and developing music.

 Each voice may be visually highlighted for easy identification.

#### "Musica 2 is GREAT!"

Stephen Wilson

"It's the best four part harmony composer on the market and the most used program in may files." R.G. Wrights

"Of all the music programs, and I've had them all, there is no comparison in flexibility, simplicity of operation and in the warm vibrant tones that it produces. I went out and spent \$700.00 on stereo equipment just so I could more thoroughly enjoy Musica 2 and the Stereo Pak!"

Howard Lentz TCI Industries



#### THERE'S MORE

- 4 Voices produced simultaneously
- Input notes from keyboard or joystick
- Play music from your own BASIC program
- Block copy music for easy music development
- 100% machine language so it is lightning fast
- Vibrato effect easily produced
- With STEREO PAK, voices may be switched between left and right speakers as music plays
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Durations include: whole, half, quarter, eighth, sixteenth, thirty second, sixty-fourth, and triplet.
- 30 page manual describes all.



That's what I was told after I gave a seminar and demonstration of MUSICA 2 and the STEREO PAK at the Chicago Rainbowfest. I smiled and thanked the young man for the "supposed" compliment, but upon reflection, I became angered by the apparent belief that the CoCo is inferior in this regard. Nothing could be further from the truth.

To help fight this false belief, we've decided to lower the price of MUSICA 2 to help spread the word.

We will also keep the STEREO PAK price at \$39.95 and give you a complete refund if you are not 100% satisfied with the STEREO PAK.



## NEW!

## STEREO PAK™

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY, Disk owners may use the STEREO PAK with the R.S. Multi-Pak or our Y-CABLE (\$28.95)





## NEW! MUSIC LIBRARY

You get over 100 four voice songs with a combined playing time of 3 hours. That's right, 3 hours of music. You won't belive your CoCo could sound so good. To fit over 100 songs required both sides of 5 C-20 tapes and the disk version uses 5 full disks (that's a half box of disks).

A JUKE BOX selection program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music.

These songs were developed using the best music program available for the CoCo; MUSICA 2. The tunes may be used as source files for MUSICA 2 and changed by the user. When coupled with the STEREO PAK the songs are reproduced in stereo with unsurpassed realism.

## **3 VOLUMES**

MUSIC LIBRARY 100 categories: Stage, Screen, and TV Music of the 70's Music of the 60's

Music of the 50's Old Time Favorites Classical Christmas (popular) Christmas (traditional) Patriotic Polka Party

**MUSIC LIBRARY 200** 

Our second volume of 100 tunes, 31/2 hours of music.

**MUSIC LIBRARY 300** 

Our third volume of 100 tunes, 3 more hours of music.

MUSIC LIBRARY (Each Volume) .. (32 K Tape) ... \$34.95 (Specify 100, 200, or 300) (32K Disk) .... \$39.95

## NEW! SPEECH SYSTEMS DATAPEN

Two programs are provided free with each DATAPEN. SKETCH is a superb high resolution color drawing program allowing precise drawing and freehand sketching, painting and much more. SHAPE CREATE is a high resolution library shape drawing program. You can even save your work to tape or disk for later display or editing.

The software is shipped on tape and may easily be moved to disk. Included is complete documentation to allow you to integrate the DATAPEN into your own BASIC program.







The DATAPEN is a lightpen, but unlike other light pens, it is far more sophisitcated.

- Insensitive to ambient light.
- Responds to different colors
- Program accessible LED lamp readout
- Switch for program control

#### WE STAND BEHIND **OUR PRODUCTS**

Like all our other products, if it is not the best, we won't sell it. If you're not 100% satisfied, merely return the DATAPEN for a complete refund.



Illinois residents add 614% sales tax





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# 'TALKING SOFTWARE'

## FOR THE VOICE, SUPER VOICE TM, RS SPEECH & SOUND PAK

#### **RADIO SHACK®** SPEECH & SOUND TRANSLATOR

any 5 of our any o or our

We believe that no COCO speech synthesizer gives you the power and flexibility of the SUPER VOICE. Nevertheless, some have decided to go with the Radio Shack SPEECH & SOUND PAK. For those we've decided to open our TALKING LIBRARY by offering the SPEECH & SOUND TRANSLATOR. Just load this pro-

gram and our entire library is open to you.

But that's not all, this program adds features. You get increased intelligibility, the power of an exception table to specify specific pronunciations, \$12.81 is spoken in dollars and cents. 1,234,567 is spoken in millions, thousands, and hundreds, and much more.

TERMTALK All the features of an intelligent telecommunications program plus what appears on the TV is spoken.

- Upload and Download programs
   Control Xmit Protocols
- Full or Split Screen
- Buffer Editing
- Normal or Reverse Video

It talks

Please specify version (VOICE or RS SPEECH & SOUND PAK) Tape \$39.95 Disk \$49.95

TALKING BINGO BINGO was never like this. The VOICE or SUPER VOICE makes all the calls while you sit back and play. Comes with 20 playing cards and 200 markers. High Resolution graphic screen, 3 timing level, ball count and pause con-

ESTHER the talking psychoanalyst. An excellent example of artificial intelligence. She may not solve all your problems, but her insight will amaze you. Just like the original Eliza.

SCORE E-Z A yahtzee type game. Up to six can play. \$24.95

#### ADVENTURES

CULT OF THE CAVE BEAR You're a stranded time traveler 50,000 years in the past. Can you fix your time machine while still surviving in this alien environ, and make it

SHIP HUNT Play Battleship with your CoCo. All status reports are spoken. Ready battery, aim, fire at will! \$24.95

FINAL COUNTDOWN You must stop the mad general from launching a missile at Moscow and causing WW III. Has multiple voices for added realism.

STAR TALK You're the Star Fleet Captain. Your mission...destroy the enemies' Dragon Star Ships. All status reports are spoken! \$24.95

ADVENTURE GENERATOR Create talking adventure games that are 100% Machine Language. Up to 99 rooms, 255 objects, 70 command words and 255 conditional flags.

64K Disk \$39.95

#### EDUCATION:



ANIMATED SENTENCES The child builds complete sentences from a graphic menu using keyboard or joystick. The action is then spoken and acted out graphically. It's a great way to learn the parts of speech (ie. verb, subject, noun, etc.)



#### PRE-SCHOOL

#### TALKING COUNT TO ONE HUNDRED

A program designed to teach the child counting to 100 by 1, 2, 5, and 10 forwards and backwards. \$29.95

TALKING ALPHABET A program designed to help the pre-schooler master the alphabet. \$29 95

TALKING NUMBERS & COLORS A must program for the very young. High Resolution graphics to insure attention and concentration. \$29.95

TALKING NUMBER SKILLS The child becomes familiar with the shape and meaning of numbers. \$29.95

TALKING CLOCK In these days of the digital clock, children miss an important education. This program aids the student in mastering the traditional analog clock. High Resolution graphics. \$29.95

#### **GRADES 2 - 6** TALKING SUBTRACTION A program

specifically designed to help the student learn subtraction. compositions, or short stories. Q & A

Multiplication, and Division are mastered. Student may specify dif-

SPELL-A-TRON Student builds a dictionary of words to be quizzed on. Perfect for Spelling B.

be spelled. \$9.95

POETRY CREATOR The VOICE speech unit is used to speak poetry that is created. \$9.95

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SHORT STORY MAKER A program to create and speak stories created by

FOREIGN LANGUAGE Learn a foreign language. French dictionary is includ-\$9.95

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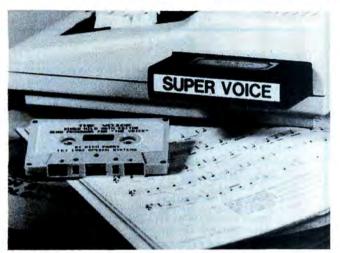
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arithmetic.

All software, except as noted, shipped on tape but may be moved to disk.

# 'SUPER VOICE'



In 1979, VOTRAX brought us the SC-01 chip which made inexpensive speech synthesis possible. Speech Systems was proud to bring the COCO community the first speech synthesizer using this miracle device.

Now Silicon Systems Inc. brings us the SSI 263 (sometimes called the SC-02). Once again Speech Systems is happy to be the first to bring you this breakthrough in speech synthesis. The SSI 263 is the most advanced speech chip available. Read "Build a Third Generation Phonetic Speech Synthesizer" in the July 84 issue of BYTE magazine for details of this amazing chip.

#### YOU DECIDE

	SUPER VOICE	BRAND X	BRAND Y	BRAND Z
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	i	1
Articulation Rates	8	1.	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4

#### SUPER VOICE SONGBOOK VOL. 1

SUPER VOICE sings many of your favorite songs. Start your singing library today! ONLY ...\$24.95

# COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

## NOW IT TALKS, SINGS AND MORE.

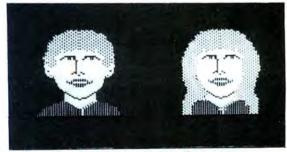
only . . . \$79.95

The SUPER VOICE gives you COCO's most intelligible speech. In addition, the free TRANSLATOR text-to-speech program allows you to easily write your own BASIC programs. Highest

quality speech may be achieved by specifying inflection, intonation, articulation, and filtration. But that's not all, the SUPER VOICE can actually sing over a 6 octave range. And while the SUPER VOICE was intended for speech synthesis, the fact that you can specify complex speech parameters means you can even create sound effects.



#### SUPER TALKING HEADS



Two heads are better than one.



When the SUPER VOICE speaks in a low pitched voice, the man speaks, when a high pitched voice is used the woman speaks. \$24.95 (see special offer)

Radio Snack® SPEECH & SOUND PAK version

\$24.95







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COD charge \$2.00
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#### SUPER BACK-UP UTILITY®

...WITH S.B.U. FROM COMPUTIZE - YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!

SUPER BACK-UP UTILITY WILL PERFORM ALL OF THE FOLLOWING FUNCTIONS:

- TAPE TO TAPE (Regardless of most protection schemes!)
- TAPE TO DISK (Move Cassette programs to Disk!)
- AUTO RELOCATE (For those Cassette programs that conflict WITH Disk operating systems.)
- DISK TO TAPE (Place Disk programs onto Cassette)
- **DISK TO DISK** (Our powerful Spit-N-Image Program, Regardless of protection schemes!)
- **MENU DRIVEN!**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES (For Disk Functions)**
- ALL MACHINE LANGUAGE!!!

COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF \$100.00 OR MORE!!!

> **★★★ONLY \$49.95!★★★** (SUPPLIED ON DISK)

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#### T.T.U. - TRIPLE TRANSFER UTILITY (C)

M/L For Cassette & Disk Program Transfer

Transfer contents of disk to tape \* Transfer content of tape to disk \* "Select" or "All" Option \* Will automatically relocate those cassette programs that conflict with the disk operating system! • Will display machine language program address \* Copies ASCII, Basic, & Machine I annuage Programs \* All contained in 1 menu driven program!!!

REQUIRES 32K CC EXT. **Cassette \$19.95** Disk \$24.95

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## SPIT-N-IMAGE (C)

M/L Disk Back-Up Utility

There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on haviang a back-up - it's good practice - Don't wait!

**REQUIRES 32K CC AND 1 OR MORE DRIVES DISKETTE \$34.95** 



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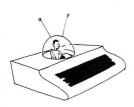
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# High Fidelity Hardware Hacking

#### By Ed Ellers Rainbow Technical Writer

• Is there any way to get parallel data in and out of a CoCo? I would like to store data using an eight-track tape recorder at a higher speed than my single track serial data recorder. Would I need more than eight tracks?

Is it possible to change the Baud rate of data to and from the cassette recorder like you can to the printer? I use a Pioneer reel-to-reel tape deck, which I'm sure can handle a faster Baud rate.

David DeGomez Denver, CO

The idea of using an eight-track recorder to store data has been tried before, but not in the way you describe. It sounds like you're talking about recording eight tracks simultaneously; that is not what the conventional eight-track tape decks do, and would require a special recording head. As for faster cassette I/O, you might try this if your computer will accept the speed-up poke:

POKE 65497,0:CSAVE"filename" :POKE 65496,0

(Ed Ellers, a RAINBOW and PCM staff member, is a self-confessed electronics fanatic whose other interests include science fiction.) This should CSAVE a program at 3000 Baud instead of 1500, though I make no promises. The reason that I have the two POKEs in a single command line is that POKEing 65497 disrupts a number of normal CoCo functions (including video); this method does the POKE, saves the file and then puts the machine back at normal speed. The same procedure (with CLOAD in the middle) would be used to load such a file. You shouldn't need to move up to a different recorder to do this.

#### **Frozen Contacts**

• I have a General Electric cassette recorder for my CoCo, and all of a sudden the recorder won't stop when it's done loading or recording a program. A friend said that my computer is not turning the recorder off and it is stuck in the "on" position. Is there any way to fix this without opening up the computer?

D. Milsom Newark, DE

I don't see how. The problem is probably in the relay inside the CoCo that controls the cassette motor; it may have become spot-welded in the closed position from excessive current and the resulting sparks. Early models of the CoCo (C, D and E boards) had a rather small relay; newer machines had a better one that clicks rather loudly. I'd have to say your recorder probably contributed to the problem. Radio Shack recorders are wired so that the remote jack switches only the motor; most other makes (including GE, as far as I know) switch all power within the recorder, which means that the relay has to carry more current than Radio Shack allowed for when they picked that relay for the CoCo. To make absolutely sure that the CoCo is at fault before trying a repair, unplug the remote plug from the recorder and connect an ohmmeter across the plug contacts. The remote circuit should read "open" unless you have the computer in a cassette I/O function (or you have selected AUDIO ON).

#### Moving The Multi-Pak

• I received a Multi-Pak Interface for my CoCo as a Christmas gift. It seems to work properly when hooked directly to the expansion port on my computer. The problem, however, is that my computer desk is similar to a typing desk and there isn't room for both the computer and the interface.

To solve the problem I constructed an interface cable about 38 inches long. I brought all 40 lines and the two grounding tab lines out of the computer to the Multi-Pak, but it doesn't work. The wiring is known to be correct, because the cable works fine for the disk controller and various cartridges. I tried a shorter (12-inch) cable with the same results. I then tried to shield and ground the whole cable with aluminum foil, and this helped, but the cable still wasn't reliable. Would you have any knowledge of a solution to this problem?

John J. Gallagher Williamson, NY

The Multi-Pak Interface doesn't seem to be able to work with extender cables, because of the many signals that go back and forth between the CoCo and the Multi-Pak unit. You might try using a commercially available shielded or twisted-pair cable (available from industrial electronics distributors), but I'm hesitant to tell you to spend the money because it may well do no good whatsoever.

#### Printer Echo No Go

• I read with much anticipation the hardware article dealing with connecting the 4-pin DIN plugs of the printer and modem together, so that everything appearing on the screen would be printed. I did the whole project, and then discovered that the Radio Shack DMP-100 printer doesn't have a 300 Baud setting. Is there any way to change the Baud rate setting on the DMP-100 to 300 either by software or by a hardware project?

Craig Luecke Brinklow, MD

The DMP-100's two Baud rates are fixed in the ROM inside the printer, and changing to 300 would be rather difficult. You could use one of the several serial-to-parallel interfaces on the market to pick up 300 Baud data and feed it into the DMP-100's parallel port. Note that this will only work if the system on the other end is operating at 8 bits with no parity; if 7 bits with even or odd parity is used there will most likely be garbage on the printer, because the characters with the parity bit added will correspond to special characters instead of regular alphanumerics.

#### 32 or 64 - What's The Difference?

• I have a 32K CoCo. I hear so much about having 64K, but I wonder what the difference is between my computer and the 64K model.

Also, I have a short program that moves BASIC into RAM. Does that make my computer 64K?

Michael Rosenberg Prestonsburg, KY

If your BASIC-in-RAM program works, then that means the machine in question is actually 64K. Radio Shack made a large number of machines between late 1982 and the middle of 1983 that actually had 64K of RAM; they only advertised them as 32K because none of the software they sold (until OS-9 became available) could make use of the all-RAM 64K mode. Some other machines were sold with 64K RAM chips installed, but were only wired for 32K because Tandy saw no need to provide 64K capability at the time.

Ed Ellers will try to answer any questions you may have about the CoCo and its applications. Send your questions to "Earth To Ed," THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

(Continued from Page 16)	seeing a product advertised?	No 64.7
T 1	Once	Age:
Too long 2.6	Two or three times 65.0	18 or Under 17.2
Too many 1.8	Six times	19-25 8.6
Too few 7.2	More than six times 9.0	26-35
Too generous 10.7	Do you like the discount coupon	36-45
Too critical 0.3	pages?	46-65
Do our reviewers seem:	Yes 85.7	Over 65
Well qualified 37.0	No	Over 65 1.7
Qualified 60.0		Occupation:
Qualified	Do you like our issue themes?	Engineer/Technical 27.6
Under qualified 3.0	Yes 93.2	Professional 19.8
Do you wait to see a RAINBOW	No 6.8	Business person 18.7
review before buying a product?	Do you use RAINBOW Check?	Student 18.3
Always 24.3	Frequently 18.4	Educator 7.5
Usually 51.8	Seldom	Skilled Trade 5.0
Sometimes	Never	Retired 3.0
Never 1.6	Would three-column listings of	Household Income:
Are you hesitant to buy from a new	BASIC programs (in smaller type) be	
advertiser?	useful?	Under \$10,000 9.2
Yes 57.4		\$10,000-\$20,000 10.1
	Yes 36.3	\$21,000-\$30,000
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Are you more inclined to buy after	Do you get RAINBOW ON TAPE?	\$51,000-\$75,000 15.2
	Yes 35.3	Over \$75,000 6.2

We had some other questions dealing strictly with the show itself and a few questions were so ambiguous that the response was statistically meaningless. For instance, there was hardly any numerical spread to the "rate our departments" and "rate our themes" responses; this is probably due to the poor wording of the questions, but could possibly be because the respondents had a wide disparity of opinions, each with their own favorites. In general, though, the results suggest that our columns on BASIC, letters to the editor and technical Q&A columns are most highly rated. RAINBOW Scoreboard and its accompanying Scoreboard Pointers

were at the bottom. In regard to themes, apparently the most popular are graphics, hardware and data communications, while the lowest ratings went to our holiday (bah, humbug, yourself), music and Simulations. With more specific questions, we should be able to learn more when we poll those who attend the Irvine, Calif., RAINBOWfest. Then, maybe we'll be ready to poll the entire readership. In the meantime, a reminder that subscription rates are being slightly increased and that you can save money by subscribing, or extending your subscription, before the first of the year.

- Jim Reed

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British Columbia
     106,300
                       Martin W. Grimm, Elkview, WV
Christopher Gelowitz, Claresholm,
     105 200
     102,400
PAC 'EM (THE RAINBOW)
       2,372
                     ★ Stephanie Gregory, Coco Solo,
                          Panama
       2 301
                         awrence Gore, Glencoe, AL
       2,106
                       Dr. James Peterson, Radcliff, KY
Art Hartsough, Ft. Wayne, IN
Kevin R. Hubbard, Huntington, WV
       2,059
PARACHUTE JUMP (Jarb Software)
62,650 *Dan Sobczak, Mesa, AZ
783 Ronald Gates, Grand Rapids, MI PIPELINE (THE RAINBOW)
                    ★Susan Ballinger, Uxbridge, Ontario
Lisa Ballinger, Uxbridge, Ontario
         478
302
```

YRAMID (R.	adio Shack)
220/113	★John Dupre, Mobile, AL
220/130	Cornelius Caesar, Gundelhardtstr,
	West Germany
220/130	George R. Fairfield, Victoria,
	British Columbia
220/133	Robert Dickau, Sacramento, CA
220/136	Andy Nelson, Winona, MN
220/138	Ellen Ballinger, Uxbridge, Ontario
-NERD (TH	E RAINBOW)
5,512,020	★Ray Ravalitera, Bethune, France
326,810	David Chabot, Granby, Quebec
184,780	Ray Suplee
181,920	Susan Bennington, Pensacola, FL
130,000	Robert Dickau, Sacramento, CA
AAKA-TU (	Radio Shack)
50	★Mike Bubb, Grafton, OH
50	*Chris Cope, Central, SC
50	★Richard Gain, Tyler, TX
50	★John Kidd, Clarksboro, NJ
50	*Barney Laverty, Gauley Bridge, WV
50	★Michael Thomas, Flint, MI
40	Ellen Ballinger, Uxbridge, Ontario
20	Russ Auld, St. Petersburg, FL
	(Radio Shack)
1,103,090	★Mike Sengstock, Meriden, CT
	(Radio Shack)
3,781,815	★Rusty Johnson, Des Moines, IA
931,395	Linda Mobbs, Pt. Huron, MI
702,125	Jeff Loeb, Mobile, AL
203,800	Andrew Lehtola, Mound, MN
88,615	Robbie Anderson, Monrovia, CA
	THE JET-I (ThunderVision)
406,788	★Chris Russo, Miami, FL
395,029	Joseph Russo, Miami, FL
389,453	Gary Bachtel, Huntsville, AL
208,602	Robert Buerkle, Conway, PA
188,000	Todd Kaplan, Lawrenceville, NJ
65,050	Todd Knapp, Prairie du Chein, WI
	K (Intracolor)
7,528,100	★Mike Scharf, Fremont, OH
3,242,812	Edwin Prather & Cory Soper,
	Oxnard, CA
2,516,050	Horace Hamilton, Calgary, Alberta
2,216,950	Randy Hankins, Tabor, IA
1,922,200	Erik Merz, Noblesville, IN

SCOOPER F	PACK (Spectral Associates)
5.000,000	★Jeff Kennedy, Scottsburg, IN
2,400,020	Kevin Hawkins, Scottsburg, IN
SEA QUEST	(Mark Data Products)
100/147	*Harry Price, Tacoma, WA
SHOOTING	GALLERY (Radio Shack)
149,940	★Robert Wallace, Waldorf, MD
85,120	Lezlee Bishop, Salt Lake City, UT
80,220	Vernell Peterson, Radcliff, KY
44,870	Mark Nichols, Birsay, Saskatchewan
44,480	R. Duguay, St. Bruno, Quebec
SKIING (Ra	
01.10	★Mike Scharf, Fremont, OH
05.85	John Hokpins, Greenville, SC
12.02	Brian Austin, New Salisbury, IN
12.08	Kelly Kerr, Wentzville, MO
12.58	Kevin Hawkins, Scottsburg, IN
13.35	Jeff Kennedy, Scottsburg, IN
SKRAMBLE	
61,020 46,440	*Paul Hotz, Herzlia, Israel
	Steve Schutjer, Hazel Green, WI NEREIS (Radio Shack)
344,115	★Ed Meyer, Vancouver,
344,115	British Columbia
47,442	Joseph DiBattista, Brooklyn, NY
34.089	Craig Alexander, Heflin, AL
	HE RAINBOW)
1:26	★Dan Sobczak, Mesa, AZ
1:57	Susan Ballinger, Uxbridge, Ontario
1:59	Baiju Shah, Deep River, Ontario
2:21	Eric Burk, Williamsvill, NY
STARBLAZ	E (Radio Shack)
11,000	★Steve Schutjer, Hazel Green, WI
9,950	Albert Diaz, Canoga Park, CA
9.700	Robbie Sablotny, Mt. Zion, IL
9,050	Mark Welte, Baxter, TN
6,850	Craig Alexander, Heflin, AL
	IFE-LINE (Radio Shack)
100,070	★Alex Gatlin, McKinleyville, CA
33,100	Kenn Booth, Grand Rapids, MI
29,670	Craig Alexander, Heflin, AL
22,610	David Sullens, Cabool, MO
16,920	Jeff Loeb, Mobile, AL
	ROWS (Spectral Associates)
35,000	★Stephane Asselin, Hauterive, Quebec

413,620	★Doug Seibel, Tumbler Ridge,
	British Columbia
248,530	Sally Naumann, Hailey, ID
243,620	Mark Wooge, Omaha, NE
225,950	Chris Oberholtzer, Lexington, MA
142,200	Fred Naumann, Hailey, ID
TOUCHSTON	
98,500	★Glenn Wasson, Castleton, NY
88,300	Michael Mefferd, Wren, OH
65,520	Kevin Marsh, Bokeelia, FL
	(THE RAINBOW)
105,300	★Jerry Dill, Frankfort, MI
87,345	Philip Parent, Smiths Falls, Ontario
76,275	Michael Rosenberg, Prestonsburg, K
74,395	Jean-Marc Parent, Smiths Falls,
	Ontario
33,454	Kenneth Bergenham, Lawton, MI
TUT'S TOMB	Mark Data)
163,060	★Michael McCafferty, Oceanside, CA
158,000	Chris Russo, Miami, FL
106,460	Eileen Kaakee, Royal Oak, MI
104,360	Gary Marshall, Layton, UT
60,780	Stephane Asselin, Hauterive, Queber
27,320	Chris Dunlap, Springfield, MA
	(Arcade Animation)
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33,090	Jack Ballinger, Uxbridge, Ontario
ZAXXON (Dat	
2,057,800	*Chris Oberholtzer, Lexington, MA
1,510,000	James Quadrella, Brooklyn, NY
666,000	Andy Green, Whitehall, PA
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370,400	Chris Coyle, Selden, NY
150,050	Jeff Kennedy, Scottsburg, IN
135,000	Kevin Hawkins, Scottsburg, IN
102,000	Bryan Jenner, Calgary, Alberta
74,700	Mike Sengstock, Meriden, CT

TIME BANDIT (MichTron)

Debbie Hartley

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

### PROGRAM EXCHANGE

Scoreboard:

Anybody looking for another insane CoCo user to trade programs with? I would appreciate it very much. It would make my gloomy day!

Todd Knapp Prairie du Chien, WI

#### DRAIN PROBLEMS?

Scoreboard:

This is the best magazine that has ever been put out on the CoCo. It takes all the bits of information from a variety of sources and compiles it into one. Keep up the good work.

I have several Adventure games and the one that gives me the most problem is Sands of Egypt. I would appreciate it greatly if anyone can help out. I've found the pool, gotten in it, can't get out, and I know I have to drain it somehow. I've also found the big palm tree. Please send the solution if possible. My address is 51-2 Maine St.,

Jeff McKay Travis A.F.B., CA

### THE 220 POINT QUESTION

Scoreboard:

In the game Pyramid, what happens at 220 points? Please write to let me know. My address is 501 Buckley Highway, 06076. Chris Caovette

Union, CT

#### IN LIMBO

Help! I am having trouble with Calixto Island. What do you do after you go down the trap door? I can't get my flashlight on. Also, in Black Sanctum, I have found the beach house, but I can't do anything with it. My son and I will be waiting for your replies so we can get going. Write me at 1446 Marline Ave, 92021.

Liz Newman El Cajon, CA

#### MISSION IMPOSSIBLE?

Scoreboard:

As it is neither practical nor possible for your editors to verify the legitimacy of your readers' score submissions, you cannot be criticized for publishing them, verbatim, on the assumption that they are genuine. No doubt, the possibility of deceit exists in any

honor system.

Most (if not all) arcade-type games allow for phenomenally high scores. In contrast, logical (Adventure) games generally do not. Adventure games usually have a fixed, maximum number of point-scoring objects, and require a certain minimum number of moves to realize a particular score. Moreover, whereas someone who has achieved an unprecedented high score in a "shoot-emup" game probably cannot duplicate that score on demand (perhaps never again), one who has reached an optimal solution in a determinate game should be able to reproduce that score consistently. With the exception of a trivial quasi-random element, the Adventure game Pyramid is a determinate game - solutions are replicable.

I do not believe that it is possible to score 220 points in *Pyramid* in less than 130 moves. The proof relies upon details of the program's (sloppy, but copyrighted) source code and data, and so will not be given here, but it is believed to be accurate and

complete.

George R. Fairfield Victoria, British Columbia

### BEST BETS FOR BEDLAM

Scoreboard:

For those of you having trouble with Bedlam, pay attention! Get the red key in the Dispensary, but first go to the Maintenance room and get the hook. Go back to the Dispensary and type GET RED KEY WITH HOOK. If the man with the hypo gets you just type PLUGH. Go right outside the shock room and type GET GREEN KEY WITH HOOK. Now that you have everything you need, find Napoleon. Go to every room and type OPEN DOOR. Pretty soon you will find a secret door. You will not be able to open it, so ask Napoleon to open it and you're home free. I forgot to mention that in order to get Napoleon to follow you, type ASK NAPOLEON TO FOLLOW.

In Raaka-Tu, search each room by typing SEARCH ROOM. You should find a gem in a crack. That's 10 points right there. Also, you should never pull the lever, just get it.

In Dungeons of Daggorath, I think I have the list of rings:

*\*\**\*\*\*\*\*\*\*\*\*\*\*\*

NAME INCANT TO

Vulcan Lime Fire Ice

John Kidd Clarksboro, NJ once just by pressing the up-arrow. If anyone knows of a software fix for this I am sure the readers that have this program would like it.

John D. Cleveland

travel across the street or logs more than

John D. Cleveland Lunenburg, Nova Scotia

#### CHOCK FULL O'HINTS

Scoreboard:

Here are some tips on Black Sanctum, Calixto Island, Seaquest, and The Crown of Merro.

To get past the natives on Merro, type LIGHT MATCH. Then type GIVE MATCHES. This will get you past them. To get past the poisoned arrows you must have the water. (You get this by pushing the nose on the fountain.) Type DRINK WATER. I'll give one more hint; you had better have your hacksaw before going in any further!

To get the caretaker's tools on Sanctum

just give him the jug of wine.

On Calixto, always get the boots. To get the paddles you must have the mice. To get them you need the trap. Then go to the pyramid and DROP MICE when you get to the snake. Always remember to have the bucket with you when you cross the river!

On Seaquest, to get into the beach house you must break the window. (The beach house is behind the falls. Just type GO FALLS and you will be in the cavern. When you enter the cavern you will trip over something. That is the shovel. Type GET SHOVEL.) To open the clam you must have the shovel. To get to the clam you must buy the air tanks with the credit card. Then type FILL TANKS. Now you can go into the water.

If anybody has found a way to open the trapdoor in the beach house or has found a way to buy the speargun on *Seaquest*, then write to me at 390 St. Charles Ave., 32953.

Keith Schuler Merritt Island, FL Scoreboard:

The game Arex has 32 different levels. After 32 it starts repeating itself from Level 12. At Level 60 you do not start out with any stars, but they do come into play. At Level 256 the game starts over with Level 1 and one star, and then increases the stars with the point value. The score only goes to 700,000 and I went through that 42 times.

This game also throws distractions in. When you get to the higher levels it will go slow and then all of a sudden it will speed up again. At times during the game it takes all your men away and you have to start over, but by then each square is worth so much that in a couple of moves you have one back.

The only help I can give in playing the game is to play aggressively. Go right after the stars. When you have 12 at a time you can usually get about 10 before they get you, if you go after them.

Barbara Blumenberg St. Francis, WI

Scoreboard:

Enough is enough! I need help with Sands of Egypt. A recent pointer in the Scoreboard hinted that you need to place the scepter on the sarcophagus to get into the treasure room.

I know this is a dumb question, but how do you place the scepter on the sarcophagus? I can't even drop the darn thing!!

Send any help to P.O. Box 115, 20862. Thank you.

Craig Luecke Brinklow, MD

#### PRESS AHEAD

Scoreboard:

I would like to pass along to the readers a little hint to use while playing *The Frog* from Tom Mix. I found out that on my CoCo 2 (64K ECB) the frog would only go once in any direction. Meaning that in order to go across the street you had to first press the up-arrow once, then go left or right before you could go ahead once more. I found that by holding down the space bar you could travel in any direction more than once. So by doing this, you can

**\*** 

Scoreboard:

I have solved the following Adventure games: Dungeons of Daggorath, Pyramid, Arconiax Assignment, Bedlam, Calixto Island, Karrak, Crown of Merro, and The Trip. If you need help with one of these Adventure games send a SASE and I will reply.

If anyone has solved *Pyramid 80*, I need help.

Chuck Poynter Hector, AR

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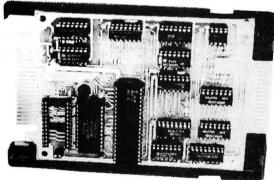


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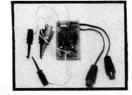
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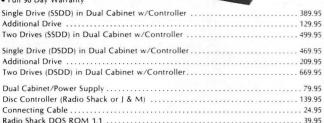
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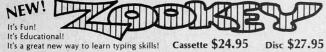
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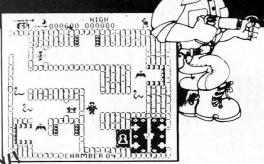


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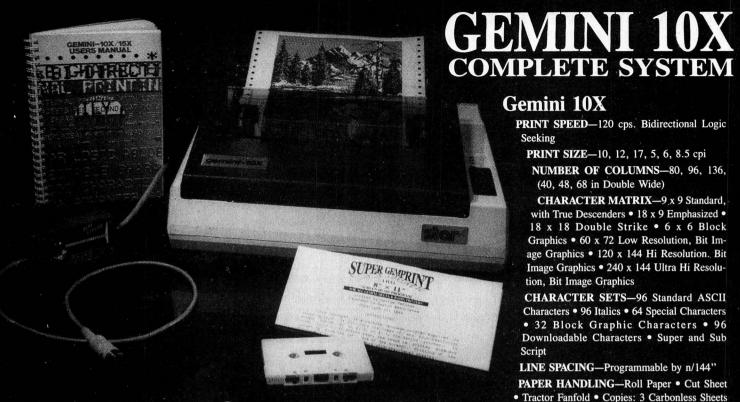


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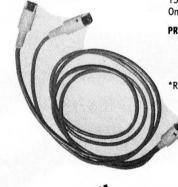
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Editor—Move forward and reverse thru buffer. Insert, type over, delete lines, characters or words. Block delete.

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\*Requires PC Pak from PBJ, Inc.

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Printer—Ignore/Add Line Feeds

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Communicate Mode:

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TRACK 35,36,40,80...change number of tracks.

**DOUBLE...** enable the double sided option.

PDIR ... print your directory to printer.

**DUMP ON/OFF...** send programs without a terminal program.

RATE 6,35 ... change the head stepping rate.

VIDEO ON/OFF...reverse video without a hardware mod.

SCROLL 1-255...change your screen scrolling speed.

COMMAND ... will list all new commands.

**DUPE 0,1,2...** will allow copy & backup from one side of a drive to another! **DATE...** you can enter the month, day and year as an extension to your programs when they are displayed during a DIR command.

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# RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purposts to be. This month the *Seal of Certification* has been issued to:

PC Index is an organizational tool consisting of a packet of 40 cards printed on both sides to fit on the protective envelope of your 51/4" diskettes allowing you to see at a glance the information a particular disk contains. ABACUS Computer Services & Education Group, P.O. Box 23438, Pleasant Hill, CA 94523, \$2.95

Air Traffic Control Simulator, a 32K simulation designed to provide an orderly and safe flow of aircraft from their origins to their destinations following an established set of rules and procedures. You, as the controller, are given this set of rules as well as a choice of three levels of difficulty to develop techniques of skill, judgment and experience equal to performing the assigned task. Betasoft Systems, P.O. Box 1174, Smithtown, NY 11787, cassette \$34.95, disk \$37.95

The Designer, a 32K ECB Hi-Res program targeted for budding young fashion designers. Possible are the creation, saving and display of more than 1,000 style combinations in hundreds of color and fabric options. Cognitive Development Co., Suite 141A, 12345 Lake City Way, NE, Seattle, WA 98125, disk \$24.95

**Diet-Ade,** a 32K program for health-conscious CoCo owners. A calorie counter is put at your fingertips, a calorie quoter tells you what to eat to attain your desired weight and a calorie minder nudges you to exercise to exceed your daily caloric limit. Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070, cassette or disk \$19, plus \$2 S/H

MAZERUNNER, a 16K ECB game requiring a joystick. As a member of the Maze Runner Corps, your mission is to fight off the forces of Ytirrod, the Pretender, from invading the Centrist Confederation and overtaking the Grand Dias from His Wisdom Arad Ennaed. You must destroy Ytirrod's fortresses by navigating remote controlled attack

power sleds. Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070, cassette or disk \$14.95, plus \$2 S/H

**Metabot**, a 32K invitation to *le danse macabre* as you trick the menacing, mimicking Metabots into waltzing into fatal fences and lethal acid pots. Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070, cassette or disk \$18.95, plus \$2 S/H

CDSORT and KEY-EXTR, two 32K utilities requiring at least one disk drive. CDSORT allows the sorting of records of up to 256 bytes by more than one key field. KEY-EXTRA is designed to allow the extraction of key fields from databases and has the ability to include only specified keys in the extraction by means of 10 possible AND comparisons specified by the user. Computize, Inc., P.O. Box 207, Langhorne, PA 19047, disk \$34.95

conversions, a 16K ECB disk or cassette utility that makes short work of converting any unit of measurement to U.S., Imperial, or Metric. Choices include lengths, areas, volumes, liquids, weights and temperatures. Cozy Software, 25142-53 Ave., Aldergrove, British Columbia, Canada V0X 1A0, cassette \$12 U.S., \$15 CAN., disk \$14 U.S., \$17 CAN., plus \$2 S/H

Disk Sort and Order, a 32K or greater utility requiring at least one disk drive. Compatible with Disk BASIC or JDOS, this program will sort directories alphabetically removing all "killed" filenames, change a Disk BASIC format of 35 tracks to JDOS' 40 tracks, restructure the entire diskette so that all granules for each file are sequenced saving wear and tear on the mechanical parts of your drive(s). Derby City Software, 3141 Doreen Way, Louisville, KY 40220, disk \$11.95

SIDE WISE, a 32-64K program requir-

ing disk drive that will read any ASCII text file from disk and print it out sideways down the page. Useful for obtaining printouts of spreadsheets that are too wide for the printer to handle. Fully menu-driven, SIDE WISE has selections of printer capabilities for Radio Shack, Epson, C-Itoh, Okidata and Gemini printers. Derringer Software, Inc., P.O. Box 5300, Florence, SC 29502, disk \$19.95

Word Processor, a 16K ECB utility that includes ease-of-use commands such as; 'D'— displays whole file (except underlines) to screen as it will sent to printer; 'Z'—display of memory left and change of Baud rate, 'H'—help key displays list of commands. Drayon Software, P.O. Box 2516, Renton, WA 98056, cassette \$5

ME-128-64, an upgrade kit to expand your 64K CoCo to 128K giving it a second bank which will run the same programs as the first bank. Complete instructions included. Dynamic Electronics, Inc., P.O. Box 896, Hartselle, AL 35640, \$169

Multiprogram Manager, a 16-32K utility which when used with Dynamic's 96KX allows the loading of five programs at once as a block. Dynamic Electronics, Inc., P.O. Box 896, Hartselle, AL 35640, cassette \$14.95

Musx, disks one through five, a 32K monthly disk that plays eight to 10 current hits in four simultaneous voices with related graphics. GRAFX, P.O. Box 254, West Mifflin, PA 15122-0254, each disk \$13.95 plus \$2 S/H

Speed Racer, a 32K racing game requiring a joystick. The object is to pass the required number of cars for each lap. This number is indicated by an arrowhead under the "cars passed" marker. You must overtake these cars to progress to the next lap. Complete all five laps (10 miles) and you've won the race. MichTron, 576 S. Telegraph Rd., Pontiac, MI 48053, disk \$34.95 cassette \$34.95

Bakersfield KENO, a 32K ECB game of chance adapted from the game Lotto. The player chooses an initial bankroll and one to 15 numbers to wager on. The payoff on winners increases as more

numbers are played and hit. It's possible to win 1,000,000 "dollars" with daring and prowess. SEIBYTE Software, P.O. Box 6464, Bakersfield, CA 93386

Chipaway, a 16K ML game requiring one joystick that pits your skill with a paddle and ball against a wall of multihued chips. Each color chip gives a different point value when hit. Options include FLIP, which flips the wall over thus displaying high point chips; COL-LAPSE, which causes any chips above the chip that the ball hits to collapse down a notch and a game save routine. Sigma Software, 14024 152nd Avenue, S.E., Renton, WA 98056-7313, cassette \$5.95

LINER, a 16K ECB game that casts you in the role of small game hunter. Your quarry: the tiny Eeblewalkers of Oktry who try and turn your system of locomotion against you. Michael Stuller, 2 Audubon Place, Rolla, MO 65401, cassette \$7.95 plus \$1.50 S/H

SBASIC, a 32-64K pre-compiler that adds commands and constructs to the CoCo. Among commands/constructs included are: LOOP/UNTIL(), IF/THEN/ELSE/ENDIF, Continue, Quit and 64K version allows source and object code in memory at once (save and retrieve with one keystroke). Tandar Software, 12 Araman Drive, Agincourt, Ontario, Canada M1T 2P6 specify disk or cassette \$19.95 U.S., \$24.95 Canada, \$3 S/H U.S., \$1 S/H Ontario and Montreal

MLBASIC, a 64K enhanced BASIC compiler designed to allow greater compatibility with existing Interpreter BASIC programs. A full compiler that features all of the commands available with Standard, Extended and Disk BASIC. MLBASIC offers additional commands to make it possible to interface programs with assembly language and write structured programs. WASATCHWARE, 7350 Nutree Dr., Salt Lake City, UT 84121 cassette \$69.95, disk \$69.95, disk \$69.95 both \$74.95, \$4 S/H

The Seal of Certification program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in THE RAINBOW. By awarding a Seal, the magazine certifies the program does exist, but this does not constitute any quarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW'S reviewers for evaluation.

- Monica Dorth

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### SUPER DISK UTILITY

Editor:

In regard to the review of Super Disk Utility I am returning a few facts that I feel need to be stated or clarified in the review.

It appears that the review is single sided towards the cataloging function and is not proportionally written with the functions supported by *Super Disk Utility*, and certain functions were not reviewed on their ability to do the task advertised or stated in the manual.

The reviewer states that there is not a search or find function in the catalog. When the program was originally written it was the author's choice not to include this function since a print function is provided to print the catalog in a neat, readable format. However, it should be stated that an updated version is being created which includes a search function and the following functions: Delete information in catalog, Add information to catalog. The fact that the same catalog can be sorted and printed in three different ways was neglected in the review of the catalog function

The Diskzap function of the program does not review its functions; instead it merely lists them and includes a commentary on the display options (which I feel could have included a printout of the displayed disk sector and a command summary of the modification mode included on pages six and seven of the Super Disk Utility manual). An important feature of the Diskzap is the allocation table check and repair. If a disk develops a file structure error or an end of file error this function can be used to fix it and save some of the files on the disk. An example of testing this feature would be to back up a disk and modify track 17, sector 2 and change some of the first 68 bytes, (change a CO-C9 to anything other than CO-C9). Whether the DIR command in BASIC will find an error or not, the allocation table check will. Use this function and follow

instructions on Page 8 of the manual.

It should also be noted that the sector skip factor is not a feature of just non-Radio Shack drives but is, in fact, a software controllable factor.

It should also be clarified that the *Disk zap 40* will work on standard Radio Shack disk drives, but it will not access above 37 tracks, and modifications to the program are allowed by the user for this purpose. The save directory feature is an important one to people who value their software—explanation: The Radio Shack DOS system is set up so that the drive head is on track 17 most of the time — reading and writing is done here every time a file is loaded or saved and failures in the drive can and do occur; therefore I created the save directory function to protect the disk from BASIC because BASIC does not access tracks 36 and 37.

I also feel that the section of the review on purge files, copy files, date files and directory sort could have gone more in depth on these functions. The reviewer neglected to mention the Super Directory function which uses the date function to get its dates and also computes the start, end and executing address of machine language programs. Each file is printed to the screen or to the screen and printer in a neat, easy to read format.

Bryan Woodruff Petrocci Freelance Associates

Editor:

In response to Mr. Woodruff's comments on *Super Disk Utility*, I offer the following thoughts:

Mr. Woodruff's feelings about the "balance" of the review may well be just a difference of opinion between the supplier and consumer (albeit surrogate). I freely admit that I did not spend much time discussing some of the "bells and whistles" in the offering. Some of the items do things that are

already built into the Color Computer while some others are the same as programs which have appeared in THE RAINBOW.

I am pleased to see that Mr. Woodruff is planning a revision to include a "search" function. This will add greatly to the utility value of the program.

Lastly, I agree with Mr. Woodruff that the "sector skip factor" is controllable on Radio Shack equipment but I felt that this would be of more interest to non-Radio Shack drive users since they might make more use of the function.

Robert E. Foiles Lancaster, PA

#### MORSE CODE TEACHER AND TUTOR

Editor:

As both a reviewer for THE RAINBOW magazine and a CoCo software author, I couldn't help but notice Cynwyn's rebuttal letter (Reviewing Reviews Sept. '84) concerning the review of some ham radio software that was reviewed by someone who doesn't know much about the subject.

I have always been happy with the programs you send me to review because they fall into my lines of interest and experience. It shows great care on your part in most cases to line up programs with the reviewer.

I don't like to criticize the work of another reviewer but in this case I will. At the time that Cynwyn's Morse Code Teacher and Tutor was reviewed (June '84, Page 250) I was in the need for a program just like that. The review did not give me any of the important details needed to make a wise purchase so I didn't order it. Just recently I saw the program demonstrated and it was quite good, much better than the review.

For a small company like Cynwyn this review may have cost them that shot in the

191

arm needed to succeed, even if in a small way, in the CoCo software world.

Here in the Bay Area, CoCo users put a lot of stock in THE RAINBOW reviews, and that's one of the reasons I try to do thorough reviews

> J. Michael Nowicki San Jose, CA

#### STYLO III FOR OS-9

Editor:

In reading Dale L. Puckett's review, "Stylo III For OS-9 — What You See Is What You Get," Oct. '84, Page 192, I was amazed to read ". . . it shows them exactly what they are going to see on the printed page on the screen while they are typing it. Stylo is the only word processor that brings this feature to the Color Computer. Others feature screen editing, but they do the final text processing while they print."

This is a gross inaccuracy. Telewriter-64 does just this — better known as dynamic

formatting.

A. David Muir British Columbia

#### PICTURE PUZZLE

Editor:

There seem to be some misconceptions concerning the program Picture Puzzle. First of all, nowhere in the documentation does it state that the user can create his own pictures using this program. To create pictures, we highly recommend a picture-designing program such as Graphicom. I believe the option the reviewer is referring to is the "Add Option." This will only allow adding a binary picture file into the picture directory.

Next, he refers to the poor quality of speech. We feel it is the finest speech available using single bit sound without any hardware. Poor quality could be the result of a

poor speaker system.

We did try to return the reviewer's call on two occasions. I am sorry, but this matter did slip our mind. We make a conscientious effort to return every phone call and provide assistance when needed.

If you have any further questions, please do not hesitate to contact us.

Dennis S. Lewandowski DSL Computer Products

Editor:

I agree with DSL's remark that their documentation does not mention how to create a new puzzle, however, let me explain why I found fault with this part of the program. The menu specifies, as choice number one, "Add New Boards." When this is chosen the screen shows, "Reading Data From Disk" and lists the three programs that come with Picture Puzzle. A question is then asked, "How many new ones?" You are required to type a number and the program then asks for the "filename". Thus, the menu option, plus

these specific questions certainly implies that a picture can be added to the program by the user. In addition, the documentation stated that, in adding a picture, you should not use the same design in two squares of the puzzle. The documentation not only does not state that it is necessary to buy an additional graphics designing program in order to add a picture; it does not explain how to add a picture even if you do have one.

While DSL may feel that the "talking" of Picture Puzzle is best without using hardware, my opinion is that the result is of low quality voice reproduction. As I said in my review, it is a good attempt but far from perfect. Please realize that I feel the program itself is quite enjoyable and while the talking does not add to it, it does not detract either.

I am glad DSL tried to return my call. As a mail order customer who paid for a program and then made a long distance call to clarify the documentation, I strongly object to not getting a reply when I am told I will be getting one. Perhaps DSL, and other companies, could request a customer's telephone number and address. If the company were unsuccessful in returning a telephone call they could send a form post card stating, "Sorry! We tried to contact you but could not. Please either write us with your questions or call again.'

> Michael F. Garozzo Morrisville, PA

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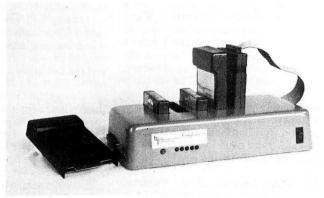
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# Compare it with the rest. Then, buy the best.

If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

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Only \$79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. Now also available for CoCo 2.

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Telephone: (716) 235-8358

Ordering Information: Specify model (Original, F-version, or CoCo 2). Payment by C.O.D., check, MasterCard or Visa. Credit card customers include complete card number and expiration date. Add \$2,00 for shipping (\$3.50 for Canada). New York state residents add 7% sales tax. Dealer Inquiries invited.

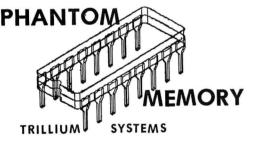
### CoCo Checker Best In Its Class

I first got involved with computers through my interest in electronics, and I got started in that by fixing TV sets. One of the beginners' books I read pointed out that the TV set would almost tell you what the problem was, if only you knew how to interpret the picture you saw. Computers are like that in some respects; as an example, if you find that you aren't getting any signal on your cassettes when you save a program, you can figure that the single-bit sound circuitry isn't putting out as it should be. A computer, being the versatile device that it is, can even help track down its own troubles, assuming enough of the machine is still working.

Radio Shack has been selling its *Diagnostics* cartridge ever since the CoCo came out in 1980 (it's still available by special order), but it has some limitations and tests only the computer itself. Spectrum Projects' *CoCo Checker* not only gives the CoCo a workout, but exercises the disk controller, disk drives, printer and Multi-Pak Interface, if you have them.

CoCo Checker comes on either cassette or diskette; I tested the disk version. Considering the nature of the program, a ROM pack might be more likely to be usable in some cases, but would be more expensive (and would make it harder to test the disk system). Bob Rosen at Spectrum suggested that if you have a disk system, you could copy the program from disk to cassette when you get it, so you aren't

Your 64k CoCo has up to 88k of memory You have 64k of RAM and 24k of ROM Use all of this from BASIC with this machine language program



With this you can:-

- Use 32k more data storage
- Chain from program to program
- Use 16 bit Integers
- Dynamically redimension arrays.

Also included, using the PHANTOM, are

PUTIL - A disk utility program

P-INVENT - A RAM based inventory program using 64k of RAM.

Tape or Disk versions U.S.\$29.95ea P&H inc

TRILLIUM SYSTEMS 67 King St. East OSHAWA, ONTARIO CANADA LIH 1B4 dependent on loading it by one means alone later on.

As one might expect, CoCo Checker has test routines for the cassette port, joystick ports, keyboard, serial I/O port, RAM, ROMs, sound circuitry and video generator; all of these are quite complete. The only RS-232 testing is part of the printer test, so you need a printer to check your machine's serial I/O circuits. (Radio Shack's cartridge uses a specially wired shorting plug, which they don't supply, to feed the CoCo's data output back into the two input lines.)

This test also gives a more complete test of the printer than the "self-test" mode it probably has, since it checks the entire signal path. The ROM checksum test is set up for all the ROMs Radio Shack has released so far. The keyboard test even checks the function keys found on the HJL, Key Tronic and Macrotron keyboards. There is even a test for timing accuracy, comparing the horizontal and vertical blanking interrupts to the master clock.

The unique features of CoCo Checker are the disk controller, disk drive and Multi-Pak tests. The controller test runs the controller IC through various steps and checks the interrupt line. The drive test checks drive speed and then writes a test pattern to the diskette in the designated drive and checks for errors. (This of course means a bad disk can cause a good drive to appear bad.) The Multi-Pak Interface test routine gives the unit's PAL (programmable array logic) chip a workout and also checks the select switch circuit.

If you do any repair work on CoCos at all, this program is an absolute must. Even an ordinary user can benefit from CoCo Checker, as it tells you whether or not the system is working properly and even what to tell the repair technician when it isn't. Now if only there was a video cassette that could do this sort of thing on TV sets!

(Spectrum Projects, Inc., Box 21272, Woodhaven, NY 11421, or Box 9866, San Jose, CA 95157-0866, \$19.95 plus \$3 S/H)

- Ray Edwards

# **Submitting Material To The Rainbow**

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

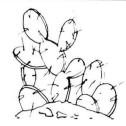
Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should so state when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently

submitted to another publication.



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PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

### TO PRESERVE QUANDIC -

It has been a long time since we were really excited about an adventure game. Adventure In Wonderland was and is the best text adventure ever written for the Color Computer. We said so, and reviewers agreed!

We are now proud to offer **TO PRESERVE QUANDIC**. We believe that this is the best GRAPHICS adventure ever written for the Color Computer.

TO PRESERVE QUANDIC is simply in a class by itself. Although it works just fine on a one drive system, the game COMPLETELY FILLS two disks. Over 300K of programming. It is four times as big as any adventure you have seen on the Color Computer.

Quite simply, **TO PRESERVE QUANDIC** sets a new standard for adventure games on the Color Computer.

The screen layout is unique. There is a window at the bottom for text messages, your inventory is displayed at all times, there is a running real time clock on the screen, and there is a picture of your current location so detailed that there are pictures on the wall, and even flowers on a table. The whole game is done in full color highest-resolution graphics. There are no better graphics available, period.

The game itself is a work of art in every way. The puzzles are fun and challenging, you can use complete sentences, abbreviations, short phrases, and there are several milestones on the way to success. Of course you can save the game in progress.

TO PRESERVE QUANDIC, you must find and return the missing piece of the time machine, and the clock is running... If you think you are ready for the best graphics adventure ever written for the Color Computer, don't miss TO PRESERVE QUANDIC. Packaged on two disks in a quality vinyl library case. Requires 32K and 1 disk drive. If you don't have a disk drive, it will be worth buying one just for this game. \$39.95

### SUPER ASTROLOGY -

This program calculates natal horoscopes to an accuracy of 1 minute of arc. It calculates all planet positions, moon, nodes, midheaven, ascendent, house cusps in five different house systems, all aspects, and even harmonics. It does tropical or sideral charts using the geocentric or heliocentric coordinate system. The five house systems available are Regiomontanus, Equal, Koch, Campanus, and Placidus. The orb for aspects can be specified within the range of 1 to 9 degrees, and even the minor aspects are computed. Output can be to the screen or printer. The program does hours of calculations in minutes, is in use by many professional astrologers, and all you have to know to use it is the date, time, and place of birth. Sure, there are other Astrology programs, but why settle for second best? Tape -\$24.95: Disk - \$29.95

### LIZPAC -

If you have a need to do statistical analysis, this is the program you have been waiting for. The only statistics package that comes close needs \$3000 worth of computer to run, costs \$1995 for the software, and LIZPAC is better! LIZPAC is 850K of programming, filling 7 disks (with an eighth disk containing sample data files and graphs), and comes with a manual that is nearly 200 8½ by 11 long in a quality binder. It will do anything you need to do in statistics. including graphic displays. In its manual, the list of features and included procedures is five pages long. Please call or write for specific information. The package is friendly to use, and no specialized computer knowledge is needed. 32K disk. \$195.00

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# Unscramble Those Boxes With High Resolution Picture Puzzle

Remember those little puzzles with eight sliding numbers and one blank? They were numbered one to eight and after you messed up the order you had to slide each number around until you could get it numerically correct. The 3 x 3 box was not too difficult to solve. So how would you like 48 boxes to unscramble, not only with numbers but with two different types of pictures?

Picture Puzzle is perfect for those of you who like to unscramble puzzles without having the extreme of a Rubik's Cube. In addition, the disk version "talks." I feel that the "talking" is similar to listening to a person using a poor quality loud speaker system. It is a good attempt at produc-

ing software speech but is far from perfect.

The puzzles are very well done. In addition to the numerical puzzle (one to 48), there are two picture puzzles. These are the "hat shape" (this design is featured in DSL's advertisement), and an optical illusion design triangle. After the disk version says, "CAN YOU SOLVE PORKKA'S (author) PUZZLE? PLEASE CHOOSE ONE OF THE BOARDS FROM MENU," the menu appears and you can choose which puzzle to unscramble. The program shows you the completed form of the puzzle and then clears the screen and



# PARENTS! GET A KID HOOKED ON COMPUTERS

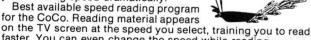
Send for our unique **LOGO STARTER** program. Use it with your 16K Color Computer and Color LOGO from Radio Shack (Cat. No. 26-2722).

Teachers agree: LOGO is the best way to introduce children to computers. Now, with **LOGO STARTER** you won't have to read a book or instruction manual. Just load the **LOGO STARTER** tape.

Your child will draw exciting designs right from the start. You won't waste your time on a lot of tedious typing. And your child will be on the way to computer literacy. \$13.95

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Complete with 6 different text selections. Plus a drill to improve visual span and perception. \$17.95

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All programs on cassette tape for 16K Color Computer. Ext'd BASIC not required. Prices include postage (PA resid. add 6%). Send check to Dept. R, P.O. Box 210, Jenkintown, PA 19046.





mixes up the puzzle by scrambling the 48 squares. You then have five minutes to unscramble the puzzle by moving the squares. Each square is moved into the one blank space by using the four arrow keys. By manipulating the blank space you can reassemble the puzzle. The author realized that it would be necessary to view the completed puzzle from time to time, so there is a help key, 'H', that pauses the timer and allows you to see the completed puzzle. When you are out of time, the disk turns on and announces, "TOO BAD, YOU'VE RUN OUT OF TIME. JUST A MOMENT. LET ME SEE IF YOUR SCORE IS IN THE TOP TEN." If your score is a high score the program will ask your name and save your score on the disk. You can continue with another puzzle or repeat what you have just done. If you solve the puzzle the statement, "CONGRATULATIONS! YOU HAVE SUCCESSFULLY COMPLETED THIS ROUND," appears and the computer then allows you to play again. But each time you solve the puzzle the computer scrambles the puzzle more than it did previously. This is truly a neverending game.

There is a bonus section on the disk that states that you can create your own puzzle pictures. The instructions say not to have two areas of the puzzle exactly the same or the puzzle will look solved but may have the two blocks swapped. This will cause the computer to lock up.

This is the section I had problems with. The directions are limited and do not explain how to make up or design a puzzle for the program. On the menu selection of "add new boards," the only thing that happens is that the program writes a new title to the disk. This new title will appear on the menu but there is no way to develop a new design. In order to solve this problem I telephoned DSL Computer Products. Their office was closed on the day I called (Monday) but a tape recording said that if I left a message they would get back to me. I explained the problem and left my phone number. They did not return the call. I do not appreciate getting a tape recording telling me an office is closed and I despise being told to leave a message if no return call is planned. I should mention that I waited eight days for a response. Many computer users rely upon mail order companies and those companies should be able to work with and help purchasers of their programs.

Should you purchase *High Resolution Picture Puzzle*? Well, do not buy it for the "talking," and do not buy it for designing your own puzzles, but buy it because the author, Joe Porkka, has done an excellent job of giving you new puzzles to solve and hours of fun.

(DSL Computer Products Inc., P.O. Box 1176, Dearborn, MI 48121, 32K Ext. BASIC, tape \$9.95, disk \$12.95)

Michael F. Garozzo

### BRITISH COLUMBIA

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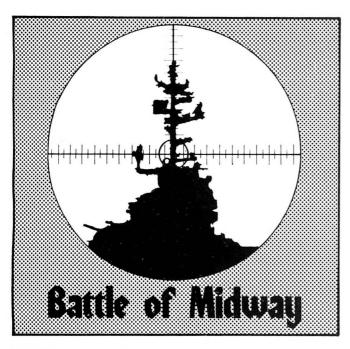
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Ark Royal's masterpiece game of naval strategy of perhaps the most important battle in the history of the United States Navy. Hi Res graphics, 75% machine language allows player to control as many as 41 separate units on the screen at one time. Command Task Forces 16 & 17 as they play cat and mouse with the Japanese fleet. Maneuver the Hornet, Yorktown and Enterprise into the best position. Set courses and launch search and attack aircraft then hope for the best. Find the enemy fleet, then pick the targets: Akagi, Soryu, Kaga, Yamato and others in this historically accurate game. Relive history, Admiral, and it won't be any easier this time around. Anchors Aweigh.

Game save. Requires disk version to operate on disk. Cassette \$27.95.



#### **COMPANY COMMANDER 32K**

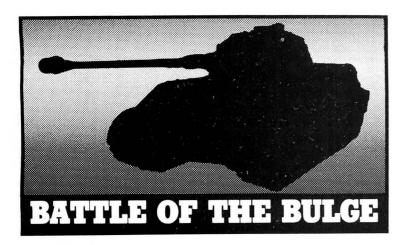
Game module 1 — **House to House**. Ark Royal's squad level WWII infantry combat game.

They said it couldn't be done — a SQUAD LEVEL wargame on a computer — but we've done it. The Line of Sight problem is licked — and the machine language routines really speed things up.

Game Module #1 comes with House to House map and 10 + scenerios involving infantry combat in Aachen, Caen, Arnheim, Stalingrad and other famous WWII city battlegrounds. Combat units include rifle squads, mortar teams, machine gun crews, engineers, and more (depending on the scenerio chosen), leaders, vehicles and other weaponry of WWII. Unique design allows incorporation of future expansion modules.

Choose campaign play and put yourself on the battlefield, Corporal Smith or Jones; collect points toward promotion. Order up smoke from the mortar squad, HE for those dug in units. Take the objective and you might make Major someday. Just don't step on a land mine.

Comes with House to House game map, more than 10 scenerios, on 2 cassettes, or all on 1 disk...\$29.95. (Disk included.)



#### **BATTLE OF THE BULGE 32K**

Ark Royal's 1 or 2 player game by the author of Battle For Tunis, Bulge recreates operation Wacht Am Rhein, Hitler's last desperate gamble of WWII. In none of our games is the fog of war so apparent than in BULGE. You know the Germans have attacked in the Ardennes, but little else. What is their strength? Their objective? Who do you send to repair the huge gap in the American lines? What bridges do you blow? Can you protect the fuel depots? Where are all those Tigers coming from? When will the weather clear?

Historically accurate, and a real challenge whether it be against the computer or a friend. (Just don't humiliate him too badly.) A game you've been waiting for. Cassette \$25.95.

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Mission: Empire 32K (Oct '82)* \$22.95	Legatus (Disk only) \$29.95
Mission: Empire 16K* \$17.95	Kamikaze 32K
Galactic Taipan 32K	(Apr '83)* \$19.95
(May '84)* \$17.95	Kamikaze 16K \$14.95
<b>Starblazer 32K</b> (Apr '84)* \$17.95	* Denotes Rainbow review

### **ARK ROYAL GAMES**

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### Option 1 Is Number One

Are you tired of digging through that old small appliance box trying to find a canceled check, only to find it in the very bottom? Or devoting an entire wall of filing cabinets just to store all those checks? If you are like me, you always seem to lose the checks that you might need later. Maybe you have one of those little critters that eat some of your canceled checks (I can never figure out how these little critters seem to know which one to eat).

We finally have a Cash Disbursement Program that will stack up against the big boys called *Option 1* by YGS Software.

After loading Option 1 you are greeted with the maple leaf from our beautiful sister country, Canada, then you are prompted to enter your own unique password (if the wrong password is entered you will be presented with an illegal usage message and forced to shut down all equipment in order to regain control of your system).

Next will be the main menu consisting of:

- 1) Issue Checks
- 2) Record deposits
- 3) Transfer tape file to disk
- 4) Sort/View by payee or account number
- 5) View records by check
- 6) Obtain balance excl. pay
- 7) Change records

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send for more information and catalog of other fine software After your selection has been made, each routine will be loaded into the system individually. When issuing checks or recording deposits a check will appear on the screen and prompt the user to input all of the correct data. The printed checks feature detailed stub printing, account number, reference number, dollar amount, check number, discounts, payee, address, city, state, ZIP code and memo.

Option 1 is designed to print on formatted checks available through New England Business Systems, however if you have your own pre-printed checks you may have to alter the printer driver to accommodate your own needs. Whichever the case, Option 1 prints crisp, clean checks at the touch of a button.

The program checks every keystroke making sure the correct data is keyed in the proper place, resulting in the process being somewhat slow, but on the other hand it could be a timesaver by keeping the user from keying in an entire check all over again. After practice the process could become considerably faster.

Option 1 is machine language and consists of a printer driver for the Epson MX-80 printer or compatible. If you do not have a compatible printer you can write your own printer routine, or you can send your printer's manual to YGS and they will write a routine for your printer at an hourly rate. Also if you ever want your password changed you can send the original program to YGS and they will change your password for 15 percent of the current retail price of the entire package.

The disk can be backed up but is not executable; first you must back up the disk with normal backup procedures and place your new copy someplace out of the way. If your original disk ever becomes inoperable you can copy the backup back onto the original disk (if the original disk is damaged the backup procedure will not work).

A few suggestions that I feel should be in business software are:

Two disks should be included in the entire package, eliminating down time as a result of sending the original disk in for a password change.

Option 1 is written for a one-drive system. An option should be included using a two-drive system, eliminating the need to switch between the main disk and a data disk. (There is a lot of disk switching involved.)

If the user forgets to take out the main disk and place the data disk in the drive and tries to save any data onto the disk without removing any write protect device, the system will crash, resulting in a loss of data that was just input from the keyboard. The system must be reset and reloaded in order to regain control. There needs to be an error trapping routine in this section to eliminate the would-be loss of what could be valuable information.

Upon receiving my copy of Option 1, I was blessed with a bad disk copy. After fighting with the disk trying to get it to load, I made a phone call to YGS Software. Assuring me that they knew what the problem was and it had been corrected, they sent me a new copy promptly. My experience with YGS was both courteous and a pleasure as they handled my problem tactfully and swiftly. So throw away that old small appliance box and devote all that wasted wall space to your CoCo and, above all, run that little critter that eats all those important checks out of business . . . I did.

(YGS Software, P.O. Box 208, Brechin, Ontario, Canada L0K 1B0, \$56 U.S., \$69.95 Canada)

- Bob Brown

## Custom Software Engineering, Inc.

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### **GET ORGANIZED IN 1985**

DATE-O-BASE CALENDAR puts YOU in charge of your schedule!

■ Graphically displays any monthly calendar between 1700 and 2099. You put in up to twelve 28 character memos per day...calendar shows where the memos are...call up of day shows details.

SU	MD	TU	ME	TH	FR	SA
		1	2	3	4	5
6	?	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
2.7	28	29	30	31	-	+
-	-	-	-	-	-	-

- Use for appointments or a log of past activity.
- Search capability allows you to list or print all memos between two specified dates or only ones meeting key-word criteria.
- Date computation shows elapsed time between two dates in days, weeks, months and years.
- Requires 32K in BASIC

TAPE DATE-O-BASE CALENDAR - \$16.95 (max. 400 memos/

DISK DATE-O-BASE CALENDAR - \$19.95 (over 4000 memos/ disk...max. 300 memos/month)

### \*\*\*\*\*

### **DISK DOUBLE ENTRY**

If you have spent hours trying to balance your Debits and Credits, DISK DOUBLE ENTRY is for you!

- Designed for small business, club and personal use.
- Enter transactions in a journal type format. Program will maintain current account balances, produce Trial Balance, Income, and Balance Sheet reports and complete Account Ledgers.
- Will handle up to 300 accounts including report headings and totals.
- Up to 1400 average transactions on a diskette.
- Summary reports and four levels of subtotals available.
- Requires 32K and an understanding of standard double entry accounting concepts.

\$44.95 in BASIC with Machine Language subroutines.

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For use with (and requires) Disk Double Entry

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# Tic-Tac Math Improves Arithmetic Skills

*Tic-Tac Math* is a tic-tac-toe game in Hi-Res graphics combined with exercises in solving math problems (addition, subtraction, or multiplication, *no* division) at a level of difficulty chosen by the student at the start of each game.

Tic-Tac Math is easy to CLOAD and RUN. All other instructions and an explanation of the game can be displayed while using the program. After the title page you are offered a choice of three types of problems: addition, subtraction and multiplication. You must then select the level of difficulty (easy, medium or hard). The level of difficulty in Tic-Tac Math is not increasingly more difficult problems such as two- or three-digit numbers, but rather a decreasing amount of time available to answer the problems! Easy gives you three seconds, Medium — two seconds, Hard — one second. All of these times can be changed by passing through the instruction screen, which comes up next after selection of difficulty. If you choose not to see the instruction screen you go directly to the gameboard screen, and the timer remains at one, two or three seconds.

The instruction screen gives you brief instructions, an explanation of the game and the opportunity to either increase or decrease the response time allowed for each problem. The documentation (one typewritten sheet) gives a conflicting explanation of this response, but the program's

screen was correct: Pressing the 'U' speeds up the response time (gives you less time to answer) and pressing 'D' slows down the time (gives you more time). For each time the 'U' or 'D' is pushed, the time is decreased or increased by a factor of 1.5, e.g., the Easy level originally gives you three seconds. Pushing 'D' once gives you 3 x 1.5 or 4.5 seconds. Pushing 'D' again will result in 4.5 x 1.5 or 6.75 seconds. Pushing ENTER on the instruction screen sends you to the gameboard screen.

The gameboard is drawn and divided into numbered squares (one through nine). You are prompted to choose a number and are in full control of which squares are to be played. You do not have to play a square just to block the computer. Immediately after choosing a number, a problem appears on the screen to the right of the gameboard and the timer begins. If the problem is answered correctly and within the time limit, the student wins the square with an 'X'. Each correctly answered problem gets one of three responses placed on the screen: "CORRECT," "GREAT," or "TERRIFIC." If the time runs out or the answer is incorrect, then the computer wins the square with an 'O' and "INCORRECT" appears on the screen.

If neither you nor the computer wins the game by the time all the squares are played, the board is rebuilt and play begins again using the options selected for the previous game. If you are successful and complete a tic-tac-toe, you are rewarded with ascending notes and "YOU WON" is placed on the screen below the board. If you lose, "COMPUTER WON" appears and descending notes are heard. You then go back to the selection of the type of problem and start the cycle over again. If you do not pass through the instruction screen, the timer is set according to the difficulty selection and does not keep the setting of the previous game. This bothered my kids somewhat at first.

A couple of things bothered me about *Tic-Tac Math*. First and foremost is the level of difficulty. The differences between difficulty levels using a time factor are somewhat insignificant as the student can pick the Hard level and transform it into a Super Easy level through the instruction screen, as my son, age seven, usually did. The unmodified Hard level is very discouraging even for an adult math major with touch typing. Mentally one knows the answer the instant the problem is placed on the screen. However, finding and pressing the right keys in less than one second is very difficult.

I much prefer the option of working with more difficult numbers. This was also expressed by my oldest daughter (age 10). The actual range of numbers used are one-digit numbers from two to nine. There are no ones or zeros. The student is given no second chance at a wrong answer and more importantly, I feel, there is no correct answer shown if your answer is wrong.

Nevertheless, my son still enjoys and talks about *Tic-Tac Math* even after several days of playing. *Tic-Tac Math* can provide the slow learner in math with ample time to solve problems and be rewarded with the accomplishment of getting tic-tac-toe. And it can provide competitive excitement to those early grade school students who are more masterful of mathematics. If your children are in the early development stage of math, *Tic-Tac Math* can provide a good foundation for basic math while they enjoy playing a game of tic-tac-toe.

(Wish Software, P.O. Box 7366, Johnston, RI 02911, 16K ECB, tape \$24.95)

- Kenneth D. Peters



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# Play The Lottery With *Lotto*

With taxpayers across the country jerking their collective knee at the mere mention of raising taxes, some of our state governments have initiated lotteries that give everyone an equal chance at becoming a millionaire and at the same time lotteries bring in some much needed revenue to the state coffers.

Like most other gamblers, lottery players have their own techniques of selecting the winning numbers to write on their ticket. Some use special dart boards, patent numbers on manhole covers or intricate formulas like multiplying their birth date by their social security number and then dividing that figure by the total albatross population of Tasmania. It's no wonder that in this high-tech world someone would write a program to handle the number selection process for you.

This program, called *Lotto*, requires 16K cassette and is written in BASIC. All you do to get started is to *CLOAD Lotto* and *RUN*. The instructions scroll across the screen at a very slow rate and it takes about two minutes for them to complete. No hard copy documentation is included, or for that matter, is needed.

Lotto is written using the state lottery rules as found in Maryland, but instructions are given for making the simple

changes to match the rules in any state lottery. Unfortunately the line numbers referenced for change are not accurate or complete and some knowledge of BASIC by the user will be required to spot the error and make the right changes. A spelling error was noticed on one of the screen prompts but that can be easily fixed as well.

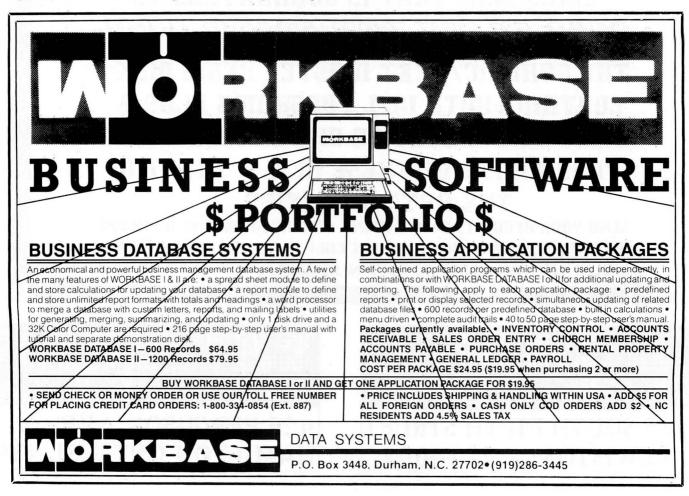
What does this program do? It picks out 40 or more different random numbers and displays them on the screen for you. It uses BASIC's RUN command to get the numbers but as many of you know, there is a bug in the RUN command that can be somewhat cured by including a program line that includes the statement X=RND(-TIMER). This fix is not included in the program so the random numbers generated are not quite as random as they could be.

During the number selection process the text screen is flashing a different color for each number generated and then all 40 numbers are displayed in no particular format or grouping.

Even if there were no bugs or errors in the program, the low purchase price does not justify plunking down any amount of cash for such a simple program that even a novice programmer could hack out in about five minutes.

(RAM Publications, 1088 Poplar Tree Drive, Annapolis, MD 21401, tape \$5.95)

- J. Michael Nowicki



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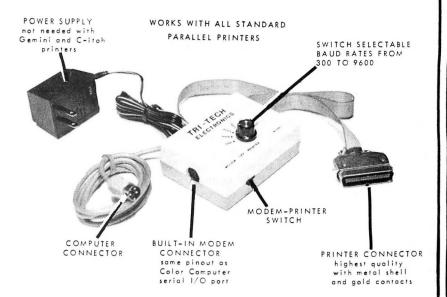
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### TRI-TECH ELECTRONICS

### The Animator Turns CoCo Into An Animation Studio

A lot of attention has been focused lately on computer-generated animation used in popular movies like Star Wars, commercials and even demonstration films like Panasonic Plane (where the company's 3-D TV system is shown off by a paper airplane flying around a house). Next to this sort of thing (which even local TV stations are using for news and weather coverage these days), what you typically see on your home computer looks rather tame. Triad Pictures' The Animator can give you a taste of computergenerated animation on the CoCo, and teaches you about the way studios like Warner and Disney do animated cartoons.

The program's sections are arranged (and named) like the departments of a film studio. The "background studio" is where you draw the backgrounds for the scenes. The "cel animation studio" lets you draw the various objects (as if on the cellophane sheets used for film animation), and the "camera department" combines backgrounds and cels to create the finished picture. The "sound effects studio" lets you add sound to the picture, and the "screening room" is where you watch the finished presentation. Finally, the

"lab" makes copies of the film or of the background and cels.

The background section is more or less a normal Hi-Res screen drawing program, working only in *PMODE* 3. You can move and draw in all directions using the arrow keys, change colors and paint enclosed areas. The cel animation section is similar, only here you are drawing as many as 32 small objects (or variations on an object) instead of a whole scene. The cel printer function lets you "take a picture" of a particular cel and "print" it in one or more cel locations, so you can repeat all but a small part of an object.

In the camera department you combine the background and the objects on the cels to form frames. In each frame you can place one or more of the cels over the background in desired positions (or have a frame with no objects), then shoot a frame and go on to the next. When you have shot all the frames in your sequence, you cut the end of the film and return to the main menu. There is also what the author calls a "rotoscope;" it's similar in function to the 8mm home movie editors that used to be common (or more like a good industrial video recorder), in that it lets you look at the film step-by-step or at normal speed in either direction. You can even put the "film" back in the "camera" at any desired frame (sounds more and more like video, doesn't it?) to shoot over from a desired point. You can shoot up to 625 frames.

The sound effects section has 12 commonly used sounds in its library. To use a sound effect you simply use the "rotoscope" viewer to locate the point at which you want it to come up, then select the desired effect and press 'I' for insert. Finally, the screening room "projects" the entire

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cartoon with sound — and does it over and over without stopping until you press 'D' to go back to the main menu. The lab saves or loads a background, a set of cels, both of them or an entire presentation (consisting of background, cels and instruction codes to re-create the finished product).

All the basic functions are explained in the first half of the manual; the second half is a 16-page animation textbook written by the program's author, Dwayne Osterbauer. In it he talks about advanced animation techniques in great detail; he speaks mostly in "film" terms (I get the feeling that he's either a very avid cartoon buff or has been/is in the business himself), but fully explains how they fit on the CoCo using his program. Several demonstrations are provided that go with the book.

The one thing that, more than anything else, causes the obvious difference between The Animator and real animation is not the relatively low resolution (it doesn't seem so bad), but the low frame rate, roughly seven or eight frames per second. Motion seems much jerkier than even the low-budget Hanna-Barbera cartoons, which were shot at only 12 frames per second. The frame rate is understandable, given the juggling act involved in moving cels (the program has to redraw the cels over the background for each frame and add sound, all in real time).

The Animator's graphics can, of course, be recorded in one of several ways. If you have a video recorder, just feed the CoCo's RF output into the VCR's VHF antenna input, set the recorder tuner to the right channel and away you go. Unfortunately, it's very difficult to stop the tape at exactly the right point for the end of a scene and restart for the beginning of the next scene (if that's your intention)

on home-type recorders. You could also use an "XL type" Super 8 camera on a tripod to shoot from the TV set (older movie cameras don't work well in this application); editing is more precise here, and if the camera has a singleframe option you can place one frame of animation on each frame of film, bringing the frame rate up to 18.

The Animator certainly is a one-of-a-kind package; I've never seen something like this on any other home computer. This seems like a very good buy for the CoCo.

(Triad Pictures Corp., Box 1299, Sequim, WA 98382 cassette \$35)

— Ed Ellers

One-Liner Contest Winner . . .

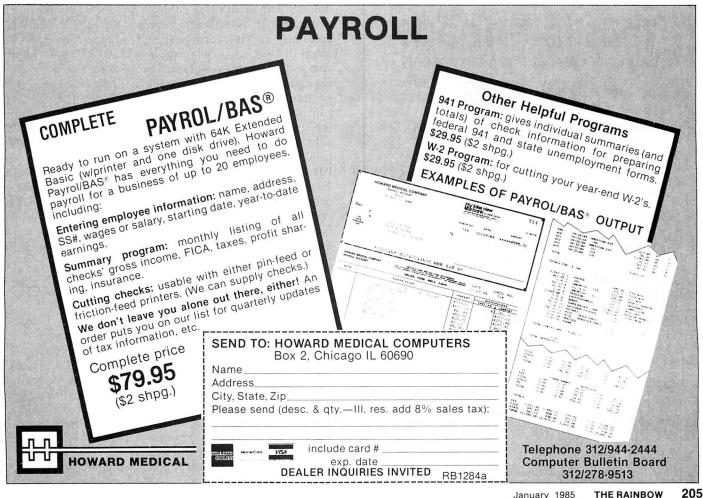
For those of you who like nice, neat printouts of disk directories, this will do the job nicely. Simply put your printer online, insert the desired disk in drive 0, ENTER its name and the program does the rest.

> Dave Helfrich New Port Richey, FL

### The listing:

10 PRINT#-2: INPUT"DISK NAME"; X\$: PRINT#-2, X\$: PRINT#-2, "---------":POKE111,254:DIR:PRINT #-2:PRINT#-2, "FREE SPACE"FREE(Ø) "GRANULES":PRINT#-2:PRINT#-2, "------":GOTO1Ø

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)



# Organize Your Disk Library With Where's-It

By A. Buddy Hogan

Have you ever asked yourself, "Now where is that program that lets me copy files from one disk to another without doing all that typing?" Or some similar question that has to do with a lapse of memory concerning the location of a program on a disk? Everyone who has a disk collection of more than a few disks will ask such a question sooner or later. Where's-It is a utility that allows you to answer such questions. It is a straightforward program that does what it is advertised to do.

Where 's-It is simply a disk index database management utility program. It allows you to create a database consisting of the directories of as many of your disks as you desire (however, no more than 972 program names can be used to build each index). You are then able to manipulate the data to suit your needs. Where 's-It is supplied on disk and is compatible with the 32K Extended BASIC Color Computer and requires at least one disk drive. The main program is written in BASIC while the sort routine is provided as a separate machine language program on the disk.

Upon running Where's-It, you are presented with a well designed menu screen that displays the nine options availa-

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ble to you. I'm going to list these options as they would be used rather than in the order presented in the menu (software developers would do well to present menus in this manner so that they are more useful):

1) ADD NEW DISK — This is the option that allows you to input the directories from your disks. The procedure is very simple. You are asked for a disk identifier (not more than five characters long) and then are directed to place the disk in the proper drive (the documentation tells you how to modify the program for two-drive operation). The directory is then read in very fast and you are asked for another disk identifier so that you can quickly add as many disk directories as you desire. I used 13 full disks containing 340 programs to test Where's-It and was able to build the database in less than seven minutes. The program actually stores the program name, the extension and the disk identifier for each program on the disk being added to your index.

2) SORT — allows you to sort the contents of your database in alphabetical order without regard to upper- or lowercase. The sort is fast since it is done in machine language. My 340 program index took less than a minute. An audible tone lets you know when the sort is complete. A nice feature would be the option to also sort by disk identifier. This way you would be able to see at a glance all of the files on a particular disk. You would obviously have to be able to store the identifier sort as a separate file.

3) LIST INDEX — prints the index file to the screen 10 programs at a time. ENTER advances the screen display to the next ten programs. An up-arrow returns you to the menu.

4) PRINT INDEX — prints your index file on an 80column printer in three columns with a maximum of 162 program names on each page (54 in each of the three columns). This is where the 972 record limit comes from (six pages of 162 each). The printout is clearly the most impressive feature of this program. The print routine was written for an Epson FX-80 and provides a title for each page of the printout that displays DISK DIRECTORY INDEX at the top in expanded print. The next line, still in expanded print, is FILENAME: XXXXXXXX - PAGE X where the X's are substituted with the proper filename and page number. The printout continues with three columns, each headed with FILENAME EXT DISK. These headings are in the normal Epson print font and are underlined. The print routine then prints out the filename, extension and disk identifier for each program that is contained in your index. After 60 lines, it skips to the top of the next page, places the printout title lines and column headers at the top and continues the printout.

5) SEARCH — lets you find either a program by name or a particular disk by the identifier that you have assigned to it.

6) DELETE/UPDATE DISK — you may delete the directory of a disk from your index or add the directory of a disk that you have updated since it was first entered into your index by selecting either DELETE or UPDATE. You are then prompted for the disk identifier of the proper disk.

7) SAVE FILE — your index file is saved to disk with this option. If you started the current session by loading an index or have saved the current index once before during the current session, you may save the index by simply ENTERing up-arrow after selecting this option from the menu.

8) LOAD FILE — is used to load a previously saved index from disk.

9) MAKE NEW FILE — erases any data in memory and allows you to start building a new index. Since this is a destructive feature, the program prompts you to be sure that you want to use this option.

At the bottom of the menu display is the filename of the index that was loaded, the number of programs contained in the index and the number of programs that can be added to it.

The program prompts you for input by flashing the cursor at the proper location. Input is taken immediately without the need to hit ENTER except for a filename or identifier. Error handling is excellent. If you have a problem while using the program, just ENTER BREAK and then GOTO 100 to get back to the main menu. You are not allowed to select options that require an index to be in memory if you don't have one there and you are not allowed to SORT or SEARCH if you only have one record in memory.

The documentation consists of five  $8\frac{1}{2}$  x 11-inch sheets of yellow paper printed in the normal fashion and folded in the middle. The documentation is adequate but could be improved. It leaves one wondering just how you are to begin to use the program. If you follow the sequence of the options as presented, you begin with MAKE NEW FILE (which talks about erasing the contents of memory — before you have entered anything into memory) then go to LOAD (you have nothing to load yet) and SAVE (save what?) before you get to ADD NEW DISK (which is where you begin).

The most glaring omission from the documentation is in the part that describes the *PRINT INDEX* option. You are told that the print routine was written for an Epson FX-80 and you are told that you might need to change some of the print variables (these are identified along with the line number where they need to be changed). However, when you get to the section on the Baud rate, you are informed that the Baud rate for the FX-80 is 9600 and that, "You may have to delete this line or replace it with some other value." End of instructions. It would not have been that difficult for the distributor to have informed purchasers of the program of the values needed to be used in Line 801 for the various Baud rates that different printers require. My Epson MX-80 worked just fine after Line 801 was deleted. Running it with Line 801 produced garbage on the printer since the Baud rate was much faster than my MX-80's 600 rate. Perhaps this observation comes under the heading of nitpicking since the owners of printers that run at other than the standard CoCo 600 should already be aware of the value that they need to poke into memory location 150 to produce the required

Where's-It is a worthwhile program that performs as advertised and would be a welcome addition to the collection of CoCo disk users who have accumulated enough programs on disk that they have to ask themselves that troubling question from time to time, "Where's it?".

(Jarb Software, 1636 D Ave., Suite C, National City, CA 92050, \$19.95)

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# CoCo Can Engineer With Space Frame

Because I used overlays years ago to "shoehorn" a major rotary-winged aeroelastic analysis into an early mainframe, I know 16K is big enough for serious work! Because I have edited reports for publication, I know a word processor is not a glorified electric typewriter. A spreadsheet is as far ahead of a hand calculator as the calculator is ahead of a slide rule.

But when the disparaging question is posed, "Can you really do anything professional on that little machine?", a negative answer can result from a limitation in the software market. I do not expect to find a supersonic wind tunnel calibration program in this magazine, and if I want another aeroelastic program (Color Computer compatible), I had better write it myself. In short, professional, specialized software is in short supply and the Color Computer user should be glad of any high quality additions to this market.

That is why Kage Engineering's release of a finite element structural analysis program is good news. Structural analysis means "Is a structure strong enough?" Can your roof withstand a snow load, or is the TV antenna mast adequate?

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Finite element means to do the analysis by visualizing ("modeling") the structure as if it were composed of a large number of little springs, usually metallic. The method is in common use in the aerospace industry, and was used on NASA's space shuttle.

Of course, when simplified to a home computer, a number of subtleties are sacrificed. Space Frame does not include buckling or torsion effects, works entirely below the plastic deformation range, and defaults to steel unless told otherwise. (That would be minor for most users, but for us aluminum addicts it means overriding a default on each and every element input.)

As far as I know, this program has no competition, so it is *Space Frame* or hand drudgery for many engineers in private practice.

Kage Engineering claims it will run even on 16K. My CoCo is a 64K machine. I have used it not only for the test cases supplied, but even to analyze a fairly complex sphere I designed. The program can use the high speed poke, but I have only tried that on one simple model — it worked fine. Without the high speed poke, a 24-element, 16-node model took about 13 minutes to run. I would consider that time quite acceptable.

The program does retain three dimensions, which means it can do real world problems as well as teach engineering. The documentation is relatively complete, and the two examples will refresh the memories of engineers who are rusty on this discipline. I encountered two problems in using the program. On my most complex model, the node deformation table which printed out at the end was not consistent with the element deflections printed just above. That may indicate a bug, or may be a problem in my model of the structure, it is hard to tell.

My other problem was on I/O. Space Frame provides the capability of saving one's input to cassette at two distinct points in the analysis. The first worked as advertised; I never was able to recover data saved at the second point. I do not consider that problem serious because most users could discipline themselves to use the first option. Conversion to disk appears simple — I know how to, but not having disk I did not bother. The progam drove a Radio Shack DMP-200 properly with no problems.

Space Frame is supplied with a utility to enable 64K users to get 8K extra by disabling Extended BASIC. The utility worked properly, and would seem a good idea for most users because it is very difficult to tell in advance how much storage a complex model will require. For most users, the program will be adequate, but I would not suggest trying to model the Eiffel Tower on a CoCo!

So long as I have access to more elegant and larger versions free through my employer, I would personally have little incentive to buy this program. (I am licensed for private consulting practice, but am not doing any.) However, were I doing consulting — or even teaching at the university level — I know of no other program available in this field and I found *Space Frame* did its job properly with no major criticisms. I look forward eagerly to more specialized engineering software from a firm that clearly put together a good product.

(Kage Engineering, P.O. Box 3010, Lakewood, CA 90711, cassette \$50)

- H. Larry Elman

### Run CP/M With Color Power II

By Peter A. Stark

Originally written in 1973 for the 8080, CP/M is undoubtedly the grand-daddy of microcomputer operating systems. There isn't a 6809 version of CP/M, but it is still possible to run it on the Color Computer with the addition of the Color Power II module which, through a combination of hardware and software, puts a Z-80 microprocessor on the Color Computer bus.

CP/M has one feature which distinguishes it from the others — its tremendous popularity. This popularity has led to the availability of thousands of programs. While some of these may not run on the Color Power II, there is still a huge base of available CP/M programs, both large and small.

#### The Hardware

Color Power II (I'll refer to it as CPII from now on) is a metal box, about the size of Radio Shack's computer cassette recorder, which plugs into the expansion port on the right side of a 64K Color Computer. The disk controller, in turn, plugs into the right side of CPII.

CPII itself contains more than two dozen integrated circuits. To avoid loading down the CoCo power supply, CPII has its own supply in the form of an external power transformer that plugs into a wall outlet and connects to a jack on the back of the CPII.

Inside CPII is a Z-80 CPU, a 6845 video controller, 2K of video RAM memory, an EPROM character generator, and an assortment of unmarked TTL ICs. The entire assembly is very professionally constructed, with gold-plated connectors and a solid support for the entire assembly.

Since the CPII provides a display of 24 lines by 80 characters wide, in both upper- and lowercase, a good video monitor is needed. CPII does not provide an RF output like the CoCo's; a composite video output jack must be connected to

### The CP/M Disk Operating System

CPII comes with a copy of CP/M version 2.2. The CPII disk is supplied in a dual format — track one and part of track 17 are in Radio Shack format, while the rest of the disk has CP/M files. To start CP/M, you must type LOADM "CP2" and then EXEC. This loads a boot program, switches to 64K mode, and then loads and starts CP/M itself.

Once CP/M is started, operation will be very familiar to anyone who has used another DOS on the CoCo. CP/M has a number of built-in functions such as DIR (to display a disk directory), ERA (to erase a file), REN (rename a file), TYPE (display the contents of an ASCII file), SAVE (to save memory contents to the disk), or USER (which allows a sort of segmented directory structure). These can be run by just typing their names followed by any arguments that they

Typing any other command causes CP/M to look on the disk for a command file by the same name. If found, that file is executed. CPII comes with the following CP/M command files on the disk:

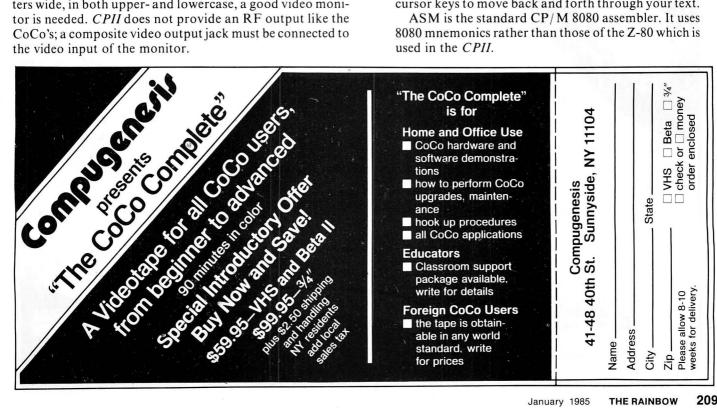
PIP is a 'Peripheral Interchange Program.' It is used primarily for copying one or more files from one disk to another, although it can also transfer files or data to and from disks, keyboard, display or printer. PIP cannot be used to copy files on a single drive.

STAT can be used to display the status of disks or files. For example, since DIR does not tell the size of a file or how much space remains on a disk, STAT can be used to provide this information.

SUBMIT and XSUB allow you to set up often-used combinations of commands as disk files and then call them with a single line command.

ED is the standard CP/M text editor. It is a line editor rather than a screen editor; this means that you do not see an entire screen full of text at one time, but only see the line you are currently typing on or perhaps the few lines directly above it, and you cannot use the cursor keys to move back and forth through your text.

ASM is the standard CP/M 8080 assembler. It uses 8080 mnemonics rather than those of the Z-80 which is used in the CPII.



LOAD is used along with ASM to convert the output of the assembler into a form which can be loaded and executed.

DUMP is a program for printing out the contents of a disk file in hexadecimal. The assembly language code for this file is also supplied, both for experimenting with the assembler, and also to show how user programs may be written to access CP/M.

DDT is the 'Dynamic Debugging Tool,' a debugging monitor program. It allows you to list or modify memory and start or trace programs.

### CPII Implementation of CP/M

The CPII implementation of CP/M consists of two parts — the adaptation of CP/M itself and a collection of command programs for use with it. (This review describes version 1.5 of *CPII*'s CP/M software.)

Adapting CP/M to a new computer involves writing some code known as BIOS — the Basic Input Output System — which is the link between CP/M and the hardware of the computer. In CPII this code links the core of CP/M to the CoCo keyboard, display, printer port and disk interface.

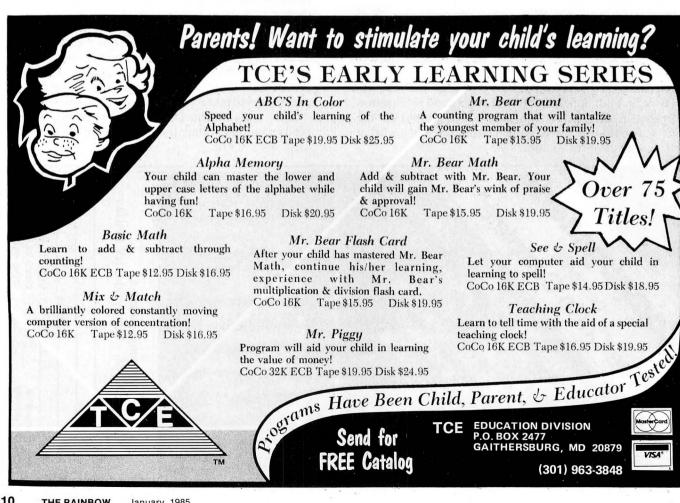
CPII lets the keyboard generate the full 96-character printable ASCII character set, plus control codes such as Control-C (used to restart CP/M) and ESC (used in many commercial programs). Many of these can be generated by single key closures, while some codes require that you press two keys at the same time.

As mentioned earlier, CPII includes a high resolution 24 x 80 display interface. Since this display is handled by hardware rather than software, it can provide excellent display quality if used with a good monitor. The video interface program which drives that hardware has been programmed to emulate the popular LSI ADM-3a terminal, so that programs written for the ADM-3a will drive the CPII screen in the same way. This is especially important for those programs which move the cursor around the screen. The only disadvantage in this case is that video display is much slower than we are accustomed to with regular CoCo BASIC.

CPII uses the standard CoCo printer port in the back of the computer. It allows operation at rates from 300 to 4800 Baud, with either seven or eight bits per character, and with either one or two stop bits. It also allows selection of whether line feeds will be fed through or not, and how the printer handshaking will be done. This covers a wide variety of printer configurations, both Radio Shack's and others'.

The disk interface portion of the BIOS is quite interesting in itself. According to the folks at Color Power Unlimited, they found that the Z-80, even running at 4 MHz, was not fast enough to handle the disk interface at double-density speeds, so they decided to let the 6809 in the CoCo handle that part of the job. The result, they say, is a complex blend of Z-80 and 6809 programming and hardware for which they have applied for a patent.

CPII uses the same basic disk format as CoCo disks — 35 tracks of eighteen 256-byte sectors each. This is quite different from CP/M's 128-byte sector, and so they pack two of CP/M's sectors into one CoCo sector. The result is a total of 146K of storage on one disk. (It is possible to use up to 40 tracks, but 80-track or double-sided operation is not possible.) A by-product of this disk format is that CoCo Disk



BASIC's regular BACKUP can be used to copy CPII disks, and DSKINI is used to format them.

In the area of disk-resident commands (CP/M calls them transient commands), CPII comes with four of its own command programs:

RESET quits CP/M and returns to Radio Shack Disk BASIC.

SYSGEN is used to generate a CP/M system disk for the CPII system. SYSGEN cannot, however, initialize a fresh disk, rather, it only modifies a standard CoCo disk for use with CP/M. Hence, to set up a new disk you must return to Disk BASIC (with RESET), use DSKINI to initialize the disk, and then return to CP/M and use SYSGEN to prepare it for use with CP/M.

CONFIG is used to change some of the CP/M parameters to fit the individual hardware used with the CoCo. It determines printer port parameters such as Baud rate (300 to 4800 Baud), number of data bits and stop bits, type of handshaking, and whether line feed characters are allowed or kept from the printer. CON-FIG is also used for redirecting output from the printer to the screen or vice versa, and for setting disk drive parameters such as number of tracks (35, 36 or 40) and drive step rate (six through 80 milliseconds). Although CONFIG allows use of up to 40 tracks on a disk, the need to use BASIC's DSKINI command to format disks usually means that only 35 tracks can be used.

CONVERT is the largest and most ambitious CPII command. It permits CPII to read 18 other popular CP/M disk formats, including those written on Access, Cromemco, DEC, Eagle, Holmes, Kaypro 2, LNW, Lobo, Morrow, NEC, Osborne, TRS-80 Models III and 4, Xerox, and Zenith computers. Not all formats can be read since CPII cannot read single-density disks, 8-inch disks, hard-sector disks (such as North Star CP/M disks) or Apple II CP/M disks; nevertheless, the CONVERT program does allow access to a large variety of software from other machines. Note, however, that this is strictly a one-way street — CON-VERT does not allow you to write disks which other machines can read. In addition, CONVERT does not let you read or write your regular CoCo Disk BASIC disks so there is no way to transfer data files, text files or BASIC programs to or from regular Disk BASIC.

For the user who wants some of the almost classic CP/M programs, Color Power sells copies of WordStar, SpellStar, StarIndex and MailMerge. Even when included with the CPII adapter, the total price is often less than the price of the individual programs on the open market. Due to a lack of documentation, I was not able to test these, but they do all seem to work. Also available is a communications program called UltraTerm+.

### **Documentation**

CPII comes with a 29-page manual which covers the basic aspects of the *CPII* system and how to use it. This is a far cry from the two thick manuals which came with my copy of CP/M-68K (which runs on a 68000). The CPII manual leaves a lot of unanswered questions, and does not cover some programs (such as the ED editor, ASM assembler, or DDT debugger), at all. It suggests that the user purchase one of the many CP/M manuals, and gives a suggested bibliography.

### **User Comments**

On the whole, the Color Power II system is a very solid piece of professional equipment. Aside from the lack of adequate documentation (which should probably improve with time), there is little one can seriously fault it with. Most problems noted were small ones, typically the kind that show up in any new product.

For example, CPII allows a fairly good implementation of WordStar and SpellStar. But a small problem occasionally causes this combination to scroll an extra line, so that when SpellStar comes back to rewrite the screen it writes one line lower than it should, thereby causing some confusion. Also noted was the fact that the BREAK key, which usually can break any program, does not work within WordStar.

The lack of a BASIC interpreter is also a small problem, especially since CP/M cannot read or write CoCo disks. (Since every other DOS for the CoCo has such file convert utilities, I am sure it's only a matter of time until they are available for CPII CP/M as well.) As a test of the CON-VERT program, I got a public domain CP/M disk prepared for the Kaypro 2 computer. Though I was able to convert and read all of it, it was a challenge to figure out a way of using the BASIC programs on it. (I eventually transferred them to another computer via the serial printer port.)

(Color Power Unlimited, Inc., P.O. Box 606, New Providence, NJ 07974, \$329. With WordStar and MailMerge, \$498; SpellStar and StarIndex \$79; UltraTerm+, \$55.)

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### RAMDOS Is A Good Disk-Type Tape Program

RAMDOS is a tape-based utility program designed to use part of available memory as a storage area to stack several programs while the rest of memory is active. The machine language routine allows for the user to departmentalize the memory by use of a CLEAR statement and an OFFSET to protect a portion of RAM. The program provides for a disk-type operating system to facilitate the movement of programs from or to storage or active RAM. The intent is to be as close to using this storage RAM as a virtual disk. The method used by the program author is that the user moves into the program routine by entering an EXEC and then selecting the appropriate command for execution and then leaving the routine to return to the active RAM area again.

The disk-like operating system of the program includes commands to save a program from active RAM to storage RAM; list all the program in storage; rename a program; kill a program; clear all programs from storage; a 'help' menu which list the commands; a 'Q' command which returns the user to BASIC; and a 'restore' command which transports a program from storage to active RAM. All of these commands acted on the programs without trouble

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The number of BASIC programs that might be stored depends on the length of the individual programs (and the amount of space reserved for storage). In a typical configuration of several short programs, each may be loaded sequentially in the storage RAM. The user then has the option of calling up any of the stored programs to the active RAM. In the transfer from storage to active RAM, the active RAM is wiped clean, thus this system was never intended to pass data between programs, or act as command stream system, or provide for linking or chaining of programs.

As noted earlier, the system works best with a group of short BASIC programs. Machine language programs may be used in this system, but such machine language programs must be assigned specific locations through the use of "offsets" at loading time so as not to overwrite the host program. The routine has trouble handling very long BASIC programs because of the memory limitations imposed by dividing the RAM into an active and storage segment. The division of RAM space is accomplished by use of CLEAR statement and loading RAMDOS with an OFFSET. The selection of a coupled set of CLEAR and OFFSET statements which provides for allocation of the RAM is the problem. If the user selects a combination that allocates most of RAM to storage, then the user might encounter the OM Error when trying to CLOAD a long program. Likewise, allocating too little RAM to storage will result in an OM Error if this large program does not have enough room to be stored.

The program, once loaded, functions smoothly and is fast. The selection of the proper sequence for loading with CLEAR and OFFSETs is the hardest part of the whole operation. The manual offers an example in which the user is instructed to CLOADM RAMDOS with an OFFSET then enter CLEAR,200 with a number one less than the OFFSET. With that example the user is left to his own experimentation. One other instruction is offered in which the manual indicates that if the user has Extended BASIC, then a PCLEAR I is necessary before loading the program. (Interestingly, one of the long programs used for the test required a PCLEAR 4 and after following the manual's suggestions, the program when returned to active RAM would not work.)

The manual's major shortfall is not being more informative on the loading patterns to be tried for different needs or RAM size. The manual's title page notes the program will run on 16, 32 or 64K computers. While true, it should be noted that it is compatible with only the lower 32K of the 64K equipped computers. The manual suggests that some bank switching programs might work with RAMDOS if the jump table is maintained. No test of a bank-switching routine was attempted.

RAMDOS might be of interest to non-disk users who might want to use part of the RAM as a "virtual disk" storage area. Within the limitation of the size of the individual programs and designated RAM, the program might fill the need of a disk-like addition.

(Dataman International, 420 Ferguson Ave. North, Hamilton, Ontario, Canada L8L 4Y9; cassette \$25.95 U.S., plus 3 percent S/H, \$2.50 minimum)

- Robert Foiles

## Super Disk Utility — A Collection Of Useful Tools

"Where is the beef.dat?" If you had used the Catalog option of *Super Disk Utility*, all that would be necessary would be to look down the printed list to learn where the "beef.dat" program was located.

Cataloging all of the files on all your disk is one of the nine operations grouped on the *Super Disk Utility* program sold by Petrocci Freelance Associates on an unprotected disk. The other operations supported are *Diskzap; Date Disk Files; Purge Files; Copy by Files; Directory Sort; Super Directory; Diskzap 40;* and *Track Formatter.* 

The program author has arranged access to seven options through a main menu system. When a selection is entered it is loaded from the disk and automatically runs. The options have submenus to offer further functions. The other two programs on the disk (*Track Formatter* and *Diskzap 40*) are machine language programs that are loaded independently as needed.

From the main menu the user can select the drive number (0 to 3) for default drive. This option is very useful for the two drive user since it allows the program to move through the options without several disk swaps. The single drive user is given prompts as to when to switch disks (system disk or data disk) and switching disks is necessary each time a major option is selected.

Operating the Catalog option is simple for either single drive or two drives. The program prompts the user to enter a name for the disk which will have its directory read into memory. The disk is read and the next name is entered for the next disk, etc. When the user has run out of disks to read (or reaches the program's limit of 800 files) the hard part of the job is done. The sorting of all the disk directories into order by either "file name," "disk name" or by "extensions" is fast. The sorted file is automatically saved (with the program assigning the extension for each of the three types of sorts). For this review a total of 30 disks were read into the catalog. These disks produced 330 files which were sorted in less than one second. The sort routine is so fast that I had to run the test twice to be sure the sort actually took place. The only way to use the results of all this fast action is to have the listing of the sorted files printed out. Again, the selection of either "file name," "disk name," or "extension" is necessary for the printout of the records by that option. Once a catalog has been constructed, the program allows for modification by either deleting files or adding to the "inventory."

Diskzap, the other "major" program in the package has its own submenu. The options provide for "allocation table check," "verify disk sectors," "display file sectors," "display disk sectors," "move" or "copy disk sectors," "covert granule #" into track and sector or "zero disk sectors." During any of the display options, the program provides for modification of any location shown on screen by moving the cursor to the spot and typing over the desired notation. Once changes are made to suit the user, hitting ENTER will save that change to the disk. This section of the program works well and a change can be entered faster than some other "zap" programs.

The Track Formatter program is able to reformat any selected tracks (up to 40 tracks) on a disk with problems or it can format an entire disk. By using this program a not yet formatted disk can be given the same status as a disk given the DSKINI pass; but the program then will go back and verify all the tracks; and in a fraction of the time required to use the DSKINI function alone. Another feature of this program that may be of more interest to users of non-Radio Shack drives is that the "Sector Skip Factor" is controllable.

Diskzap 40, according to the program author, allows accesses to 40 tracks for those users not using Radio Shack equipment. This program was not tested since the system used for this review was standard Radio Shack equipment (which only has 37 tracks). The program also allows for a shifting of a copy of a disk's directory to track 37 as a "cash protection" option. Naturally, the directory restoration option is also included.

The 13-page manual covers the programs and indicates those areas where problems might occur. It is clear and easy to follow. Page 14, however, is printed in such a small print that it is almost unreadable; but it appears that page is the "End User Agreement."

The Super Disk Utility is a collection of some interesting and useful tools and some functions that may not be of interest to some users. The ability to purge files, copy or date a disk file, as well as the Directory Sort option which will read the directory, sort in alphabetical order or group by extensions and rewrite to disk, all from within the program, are there if you want them.

However, the Catalog option has a fast sort function; but there is no search or find function included. Thus, the speed of the sorting is outweighed by forcing the user to go to the slowest operation of the system — the printer — to make use of the information. There are other Catalog programs on the market which include a search function and sell for a fraction of the cost of this program.

This set of disk programs may appeal to some users as it is offered.

(Petrocci Freelance Associates, 651 N. Houghton Road, Tucson, AZ 85748, disk \$29.95)

- Robert Foiles

One-Liner Contest Winner . . .

Guaranteed to drive you up the wall after a minute or so, this program draws a circle that gets larger and smaller over and over!

> Michael Rosenberg Prestonburg, KY

The listing:

Ø PCLEAR8:FORX=1TO8:PMODEØ,X:PCL S:CIRCLE(128,96),X\*10:NEXT:FORX= 1TO999999:FORY=1TO8:SOUNDY\*20,1: PMODEØ,Y:SCREEN1,1:NEXTY:FORY=8T O1STEP-1:SOUNDY\*20,1:PMODEØ,Y:SC REEN1,1:NEXTY,X

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)

## Star Trap Game Promotes **Cooperation Among Children**

Star Trap is a new and different game for one or two players aged seven or older. It is produced for Radio Shack by the Children's Computer Workshop — an activity of the Children's Television Workshop (the producers of Sesame Street, the Electric Company, and 3-2-1-Contact). Supplied on cassette, this game requires Extended BASIC, and joysticks.

Before describing the game, I'd like to tell you how it differs from most games. First, this game teaches cooperation, rather than competition, when played by two children. The two players work together to accomplish the game's objective — to trap the computer-controlled star.

A second difference is the cassette format. Side one contains the "standard" game, ready to be loaded and played. Side two contains a modified version which allows the player(s) to "customize" the game via an easy-to-understand menu. Selections include the game (maze) size, background color, player and star speeds, active gates (explained below), and several miscellaneous options: the number of X's (used to trap the star), whether blockers are desired, the number of players, and the presence or absence of the maze walls.

The object of the game is to trap a single star — to block its movement either with X's (placed at the player's position

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when the joystick button is pressed) or by cornering it against a wall or between two players. The score depends on the time required to trap the star and the number of X's used — the shorter the time and the fewer the X's used, the higher the score. There are six gates which affect the players and star differently when passed through:

- 1) The X gate replenishes a player's limited supply of X's.
- 2) The speed gate increases the speed of the object passing through it — whether a player or the star.
- 3) The slow gate decreases the speed of the object passing through it.
- 4) The jump gate causes the object entering it to exit at a different location.
- 5) The invisible gate renders the star invisible for a short time after it passes through.
- 6) The magic gate allows the star to pass through walls for a short time.

When playing the customized version (on side two of the cassette), each of the gates can be included or excluded via the menu.

To further complicate play, blockers appear periodically at random locations for a brief period to block both star and player movement. (These blockers also can be included/excluded via the menu when playing the customized version.)

A detailed instruction book includes step-by-step procedures to assemble the necessary hardware, to load the program from cassette, and to play the game (using either the standard or customized versions). Possible difficulties and typical solutions are included throughout the book. All game symbols are explained and player strategies are outlined. The final pages suggest several related games that don't require a computer.

As you have probably inferred, I'm impressed with Star Trap — its unusual format, its cooperative nature, and its complete instructions. It encourages children to modify the game, possibly piquing an early interest in programming. Radio Shack has a winner in this game.

(Radio Shack stores nationwide, on cassette for \$19.95)

Jerry Oefelein

One-Liner Contest Winner . . .

This is a very "graphic" demonstration of how things drawn in one PMODE look when switched to another.

> Bill Valentine Fort Worth, TX

The listing:

Ø PMODE RND(5)-1,1:SCREEN1,1:X=R ND(128):Y=RND(8):HW=RND(185)/99: CIRCLE (126, 96), X, Y, HW: PAINT (128, 96), Y, Y: GOTO Ø

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)

## **Learning To Count** With Counting Things

Two programs helping children learn to count and recognize numerals are presented on the tape, Counting Things. Instructions and guidelines for the parent or teacher are included as a separate, introductory program, which advises the adult to explain the programs first, demonstrate their operation, and pose questions which can be answered by using the programs.

The first program, Counting Things, asks how far the child wishes to count and then goes to a Hi-Res screen showing three vertical lines labeled 100, 10 and 1 and, in the lower half, zero is spelled out and a 0 is shown on the screen. Under this, the computer asks, "What is the next number?" When the numeral one is pressed, the bottom portion of the screen shows the number one and spells out one, and, in the upper portion a plus appears and one small horizontal line is drawn on the vertical line in the units column. The program continues in this manner, adding lines to the units place. until the number 10 is reached, when a small line is placed in the tens column and the lines removed from the units

column. This visualization of the number line, the place holding property of zero, and demonstration of how the number system works in moving from the units to tens to hundreds places is valuable, particularly if an adult has posed one of the suggested questions so that the child's attention is drawn to this feature of the program.

The second program is similar, although this time the child first enters how many numbers he knows and the computer then places numbers of pluses on the screen and draws corresponding numbers of small lines on the vertical lines, requiring the child to enter the numeral which the pluses represent. Both programs respond only to the correct number.

Thompson House wisely points out that these programs are not intended for repeated use to gain mastery, but rather to reinforce learning at various stages. At first the child learns to press the next number in the sequence, and becomes familiar with the written word for each number, then he counts objects and gains an understanding of the number line and perhaps some better understanding of the base 10 number system.

(Thompson House, P.O. Box 58, Kamloops, British Columbia V2C 5K3, 16K ECB tape \$14.95)

Carol Kueppers

## **Standards**



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#### Software Review

### Pak-Panic — The Old Game With A New Twist

With centipedes, monsters, invisible mazes and ghosts that can go through walls, *Pak-Panic* from Tom Mix Software is unique compared to all of the competition. *Pak-Panic* is a 32K 100 percent machine language, arcadestyle game that uses the left joystick and firebutton.

The scenario is as follows: You are Pakman. Your job is to go around the screen eating dots, power pills, and bonus prizes while avoiding monsters.

A power pill is one of the larger dots on the screen. Seven are on levels one through four. Six are on levels five through nine. When a power pill is eaten, Pakman has the power to eat all of the monsters he pleases. Whenever Pakman eats a monster, his ghost appears at the top of the screen. When seven ghosts have appeared at the top of the screen one of two things will happen. Either one of the ghosts will come out and float around the screen (even through the walls) hunting for Pakman, or the seven ghosts will link together to form a centipede that will do the same thing. Even with power pills, Pakman cannot overpower ghosts or centipedes.

Bonus prizes appear in the middle of the screen about twice a board. When bonus prizes are eaten they are stored in a box below the screen. When 14 prizes have been eaten you get a bonus of 14,000 points. This can only happen twice.

Four more tricks the programmer threw in to make the program better are invisible mazes every four rounds, the ability to store power pills, a selection of difficulty at the beginning of the game, and a high scores board.

You can store power pills by eating a pill while a previous pill is in effect. Stored power pills can be used by pushing your button while no power pill is in effect. A maximum of six power pills can be stored at any time.

I liked Pak-Panic and I think many other people will like it.

(Tom Mix Software, 4285 Bradford NE, Grand Rapids, MI 49506, tape \$24.95, disk \$27.95)

- Pat Downard

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## Test Manager — A Useful Addition To Your School/Home Library

Test Manager is a program that allows you to create files of multiple-choice questions, then select specific questions to be printed on a test. An answer key is also printed with each test you prepare. Test Manager requires a 32K disk system with a printer. The program will work with one-disk drive with a minimum of fuss, but a two-disk system will make life easier if your files contain more than 75 questions. Question files can contain a maximum of 150 questions.

This program works exactly as described in the documentation. The documentation consists of six pages of information, clearly worded and neatly printed. The program worked without flaws for two weeks of rather intensive use. I made up a variety of tests, using all the options on the menu. One of the especially nice features of a program of this type is that it allows the teacher to create one set of questions (say 75) and then create five or six different versions of the test, each with its own key. This, of course, cuts way down on the chances for cheating, as well as allowing for individual differences in students or classes.

You begin by setting up your file of questions. Each question can be up to 245 characters long (I found this to be more than adequate.) A bracket is used on-screen to mark the end of the space allowed for a question, a very handy feature. If you do exceed the limit, the program tells you so, erases your question, and invites you to try again. Previously entered questions are not lost. After each question is entered, you enter the answers, correct answer first (the answers will be presented in true random order when each test is printed).

You can create true-false tests by just entering two answers and entering a blank for answers three and four. Answers can be up to 180 characters long. This allows for complete thoughts to be used rather than just one-or two-word answers. You may go back and add, delete or change questions later if you wish. The only restriction to this is that you cannot delete a question from a file containing more than 75 questions unless you are using a two-disk system. Both single and two-disk systems will hold a maximum of 150 questions in a file. You may also merge two different files together to make a new file.

Next, you select the questions you wish to use on a test. These can be from more than one file. The process of selection creates a new file of your selected questions, so you need to be careful not to try putting this new file on a nearly full disk — another place where two-disk systems make life easier! You then print out the test. You are asked for a name for the test, the form code (so you can match the correct key to the test), and the name of the file that will be used in printing. The program will also print a space for the student's name and class. You have the option of printing the questions in the order you selected them, or having the computer print them in random

order. The answers are always printed in random order, even though you entered the correct answer first. The page break will always be between questions.

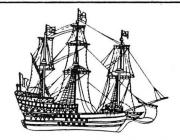
The printed copy of the test is neatly arranged, ready for photocopying. Or, since nearly all printers using friction-feed can print directly on a ditto master if the ribbon is removed before printing begins, you will have a letter-perfect test and no purple ink on your fingers! (See Valerie Rhead's article on Page 140 of the September issue of THE RAINBOW for a full discussion of this.) You have the option of single sheet printing (useful with the dittos) or continuous printing.

The only fault I found with Test Manager is that it isn't very economical with paper. Even with one line questions and one word answers, the most questions you can get on the first page is seven (eight on subsequent pages.) For long tests, you will have a number of pages to ditto or photocopy. If your printer supports a condensed-print mode, this may help. You could also ditto pages back to back, and some photocopy machines have this feature as well

Overall, *Test Manager* is a well-developed program that does just what it claims to do. It would be a useful addition to your personal or school's software library.

(80 Custom Software, 5720 Brooke Lane, Sylvania, OH 34560, disk \$29.95)

- Mark Williams



#### THE SPANISH ARMADA

In the summer of 1588 King Philip of Spain's "Enterprize of England" sailed up the English Channel while Europe watched in apprehensive silence. The SPANISH ARMADA recreates the problems faced by the English Commanders as they struggled to defeat the Armada. Only this time it's up to you! Using weapons of the day, can you defeat the Armada? Cope with fickle winds? A relentless current? Difficulty of supply? It won't be easy, but it's fun to try.

The game requires at least a 32K computer and is compatible with either cassette or disc systems. Both versions are shipped on tape.

THE SPANISH ARMADA .....\$24.95

Send check or money order to Picosoft Games, P.O. Box 35, Eighty Four, PA 15330; (412) 267-3721. Games are shipped postage paid. PA residents add 6% Tax. No delays for personal checks.

## Key-Wiz — Easy, Fast, Useful Database Manager

Key-Wiz for 0S-9 is a simple, useful utility, especially for those who don't have the money for a \$200 database software package. This program "is a multikey search utility designed to quickly search a file of index cards and find all entries which match a profile of keywords" and "logical operators such as AND, OR, and NOT to provide a very selective search criteria." This simply means it will find "entries" in a simple text file by searching for "phrases" or words you specify. An entry is nothing more than one to 60 lines of text 80 characters or less. Each entry is separated by a blank line and nothing more, so any 0S-9 utility that can create such a file, such as a word processor, can create your database.

Supplied with Key-Wiz is a sample database containing two lines per entry. The first line contains a book title and author, the second line contains a publisher's name. When invoked, Key-Wiz will present you with a menu of options. You can specify input and output files when you execute Key-Wiz or you can select the 'I' and 'O' menu options to specify those files after executing Key-Wiz. These

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Credit card orders call: 800-621-0105 (In Illinois call: 312-545-9286) NO SHIPPING CHARGES!!! assignments can be changed at any time while in the utility. Your output file is, by default, your screen and can be changed to a disk file, or perhaps to your printer. You can also select options to limit the search to any number of lines. For example, if you know the word(s) you are searching for are contained only in the first four lines, and each entry is 15 lines, you can tell Key-Wiz to search only the first four lines of each entry, thereby speeding up the search considerably. And Key-Wiz is quite fast, considering the work it must do. You can also limit the number of lines output for each match, thereby formatting your output to show only the data you wish to see. You may also tell Key-Wiz to display the output continuously or to pause after each entry displayed, waiting for you to press the ENTER key for the next entry. Key-Wiz also comes with Sort-Wiz, a quick sort utility designed to sort the entries on any line you choose. This is desirable for sorted output, and the standard OS-9 sort utility, if used, would sort the blank lines to the beginning of the file. This would destroy the entry markers in your file (the blank lines), hence Sort-Wiz.

I found one annoyance and one bug in this otherwise excellent utility. The annoyance is that there is a useless "Help" option, which does nothing more than redisplay the menu. Simply pressing ENTER does that already. It may make the program too large, but it would have been nice to have a brief "help" for each menu choice. The bug I found occurs like this: I've opened my input file and entered my search criteria. Entries which match are being displayed just fine. After seeing about 10 entries, I don't wish to see the remaining possible hundreds of matches. How do I stop the search? If I use BREAK, I interrupt the program completely and am dropped back to 0S-9. My CHD and CHX directories revert to bootup default! If I use CLEAR BREAK, the display continues, and when done, I see the menu constantly being redisplayed and it doesn't stop! The only thing I can do here is press BREAK and completely terminate the program! There is definitely a bug. There is an 'E'xit command in the menu which works perfectly, and even closes the files, but that is for "normal" completion.

Overall, for the price it is an excellent little database utility, again, for those who do not need or cannot afford the more expensive, though more powerful, database management software.

(Interactive Micro Systems, P.O. Box 21007, Columbus, OH 43221, disk \$24.95)

- William Van Nest



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## Howard Medical Disk System Offers More Storage

Many CoCo users are no doubt aware that several of the more popular personal computers (such as the IBM PC and PCjr, and Radio Shack's Model 1000, 1200 HD and 2000) use double-sided disk drives to cram twice as much data on each diskette by using the "other" side of the disk. All diskettes that I know of have a magnetic coating on both sides (unlike recording tape, which is almost always single-sided), but so-called "single-sided" disks are only guaranteed to work on one side. In practice, single-sided blank diskettes generally work fine with double-sided drives. Howard Medical's *Drive O Package* lets you get up to 360K on a single diskette on the CoCo, and is also able to handle standard CoCo disks.

The *Drive 0 Package* consists of a DD-2 double-sided disk drive (with case and power supply) and a J&M Systems disk controller. A special cable is also included. The disk drive is a TEAC half-height unit, the same one used in the Sanyo MBC-550-2/555-2. Its case is sturdy, though plain, and the power supply is well able to drive it.

The JDOS operating system supplied with the controller

is the key to using double-sided drives on the system. It is capable of using either 35 or 40 tracks and either one or both sides. The J&M controller is also configured for double-sided drives. All you have to do is format your disks on both sides in the J&M format, like this:

DSKINI 0, 2, 40

Disks formatted in this way will have 360K of space available. JDOS automatically adjusts for the format of whatever disk you use, including standard Radio Shack disks.

One problem with using JDOS is that a few programs (such as *Telewriter-64*) are very dependent on Radio Shack Disk BASIC features and won't run with the entirely different JDOS ROM. If you have a Radio Shack disk controller, you can use it with the new drive with no problem (but only on Radio Shack-format disks). If you have 64K, another way would be to use the SYS SAVE and SYSTEM programs in Part I of "Cooking With CoCo" (August 1984, Page 18) to save Radio Shack Disk BASIC on a special disk and use it in place of JDOS if needed.

If you think that 360K per disk will help you use the CoCo more effectively, the *Drive 0 Package* is a good buy.

(Howard Medical Computers, Box 2, Chicago, IL 60690, \$395 plus \$7 S/H)

- Ray Edwards

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# Calorie Counter — Weight Analyzer Is Just What The Doctor Ordered

Draco Software's Calorie Counter — Weight Analyzer program is just what the doctor ordered. This tape-based program offers a well-rounded choice of over 400 food items to use in daily menu planning, with guidelines given on how best to plan your diet program.

A seven-page guide and instruction booklet outlines the basics to allow the user to lay out a regular, well-balanced diet for children, teens, adult males, adult females and lactating females. All that is missing is a guide for pregnant females, and perhaps it is intended that, in such cases, direct medical supervision of diet is called for.

Once the program is *CLOADed*, *RUNning* should get you going. (I have an older CoCo with the *PCLEAR* problem, and so had to type *RUN* twice.) A brief quiz allows the computer to determine your correct weight, and displays it on the screen. You should make note of this, as you will need it later when compiling your daily food selection. Something that might be done in a future edition of the program is to check if a machine is 64K and if so, *POKE* the maintenance calorie level into high RAM. Then when the next section is loaded, it could check and

PEEK the information into the program, to be displayed for reference. A minor point is that age is not considered in determining the calorie level needed to maintain body weight. While the difference may not be great, a 20-year-old of a given size and weight will burn more calories than an equivalent 50-year-old.

A very few items needed further clarification of serving size (chef salad, raw carrot) but in almost all other cases the serving is given in standard cup or ounce increments.

The ability to store a daily menu on tape for future use allows the user to build a "file" of menus which, with a little planning, would allow a dieter to plan a varied meal plan and cut down on those moments of indecision which might otherwise lead to the kind of snacking that can lay the rest of a day's good intentions to waste.

A nice option, should you succumb to temptation, or if you have a food not on the listing provided by *Calorie Counter*, is one which allows you to enter an extra calorie amount. This allows you to account for (my favorite) ice tea with extra sugar, or other personal foibles.

A printer option gives the user a hard copy to keep by your refrigerator or to take to the store. This can help reduce nibbling, as well as cut down on impulse buying.

Both fun and (sometimes) depressing to use, Draco's Calorie Counter should prove a good buy for any dieter.

(Draco Software, 22 Cassell Street, Portland, ME 04102, \$29.95)

- Nevin J. Templin

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## Talking Adventure Starter — A Vocal Experience For Adventurers

#### By Kenneth D. Peters

Welcome to Adventuring with voice responses! Talking Adventure Starter Package by Owls Nest Software consists of two Adventures, MYHOUSE and PIRATES, and a two-page documentation designed to help teach Adventuring to the beginning Adventurer while providing the unique experience of vocal responses throughout the Adventures. As an added attraction, these Adventures are relatively simple, nonviolent, and fun; suitable for very young children of reading age.

Owls Nest has two versions of the Adventure Starter Package. The standard version was reviewed in the February '84 RAINBOW and has only a text response. The Talking Adventure Starter is meant to be used with Colorware's Real Talker voice pak, introducing you to Adventures with the added realism of voice responses.

The reviewer of the standard Adventure Starter mentioned having to remove the disk controller and enter PCLEAR 0. If that was a problem then, apparently both conditions have been improved. I found both Adventures in the talking starter package loaded with a simple CLOADM operating under Disk BASIC. The actual Adventures are written in BASIC, but use CLOADM to load and auto execute and also to provide an initial screen to read while the Adventure loads.

I was disappointed by the lack of an introductory voice when the Adventures first begin. In MYHOUSE, you are given an Adventure welcome (in text form), with the object of the Adventure being to find the hidden golden coin and return to the front porch. (First you must find a way to enter the house.) I anxiously waited for a voice to come forth and welcome me while I was trying to decide what to do. None came. "Where's the voice? I thought this was a talking Adventure." My initial disappointment passed as I progressed through the Adventure. With increasing interest and enthusiasm I discovered that the voice pak was used primarily for responses to the Adventurer's commands: East, West, North, South, Help, Get Paper, etc. Actually, my kids and I found that the voice talked to us quite often as we explored the house using one- or two-word commands, such as "Open Door" and "Read Paper". Moving through the house by entering compass directions (N,S,E,W) and Up and Down sometimes provoked a vocal response. Sometimes the Adventure voice provided us with a humorous response to our commands and movements. Sometimes it gave us some useful clues. Overall, use of the voice pak gave us a remarkable experience not to be soon forgotten.

One thing about the Adventure that bothered me was the slow character print on the text screen. MYHOUSE has a poke in it that reduces the character printing rate across the screen. I found it annoying to have to wait so long to see what the response and changes were on the updated screen. However, I am not a beginner in Adventures and after thinking about it, I realized that



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feature could be a big plus in helping draw the attention of beginners to screen updates and the fact that changes may have taken place as a result of something they just did, but may not be obvious unless they actively look and review their surroundings. In *PIRATES*, the poke has been modified so the screen is updated much faster. (Being written in BASIC, both Adventures can be altered to delete the poke if desired.)

Lack of a vocal welcome and the slow screen update are minor. I think the *Talking Adventure Starter Package* does a super job of developing an interest in Adventure game playing and in providing the beginning Adventurer with many detailed hints, clues, and ideas about playing Adventure games. I watched my two older children, ages seven and 10, play *MYHOUSE* with the same engrossing and endless enthusiasm as they play the arcade quality games on the CoCo.

In addition to the excellent documentation containing all the helpful hints and ideas, both Adventures use the HELP command. HELP is used extensively in the first Adventure, MYHOUSE. Typing HELP invokes a vocal response ranging from giving you moral support to suggesting new ideas to try or things to look for, to telling you simply that nothing will help you here. MYHOUSE is relatively simple, meaning there are few rooms, movements, and obstacles to overcome and contains no death traps. Additionally, MYHOUSE is similar to your house and mine — a setting we all have some familiarity with. In the eyes of a child or beginning Adventurer no Adventure may seem simple at first. I found MYHOUSE quite enjoyable and it introduces the basics of Adventuring very nicely.

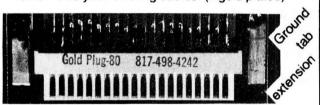
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PIRATES is also relatively simple, when compared to other complex Adventures that take days and weeks to complete. There are relatively few moves (rooms/scenes) in PIRATES and they are easily mapped out. But PIRATES is much more involved and complex than MYHOUSE, and contains several death traps. Your goal in PIRATES is to recover the pirate's treasure. PIRATES introduces a greater depth and exposure to the subtle ideas, increased number and variety of verbs, the importance of doing the right thing at the right time, and the persistence needed at times to obtain a desired result and finish an Adventure.

Both Adventures have a game save feature. I used the option in both Adventures to make sure it worked; however, some Adventurers may find they do not need it. I finished MYHOUSE Adventure within an hour. My children both finished it within a half-dozen sittings (one-half hour to one hour per sitting). PIRATES took considerably longer but is possible to complete in one evening unless you really get stuck.

I thoroughly enjoyed both Adventures. I keep reading or hearing about many people who get discouraged and frustrated by Adventures and give up or lose interest. I believe both programs and the accompanying documentation provide enough help and foster sufficient interest to ward off such feelings. At the very least, *Talking Adventure Starter* would probably give the unsure beginning Adventure player a truer feeling for what Adventuring is about and an opportunity to enjoy and learn more about Adventuring.

If you've been contemplating Adventures or if you've tried Adventures and have become frustrated with them, I would recommend giving Talking Adventure Starter a chance. I also would highly recommend the Adventure Starter as an ideal nonviolent Adventure for young children, age six and up (reading age). The children love it and you might even consider a joint parent-child partnership in solving the Adventures. Even if you are beyond the beginner's level, I think you'll find these two Adventures enjoyable. Both are possible to finish in an evening and both will give you a unique vocal experience. By the way, if you don't have Colorware's Real Talker, the standard text Adventure Starter is also available.

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## Play With Language Is Exhilarating, Entertaining And Educational

By Michael F. Garozzo

It is hard to believe how far computers have developed in the world of education. After all, it's not *that* long ago I attended school. Actually, of course, education is an ongoing experience, and we all are continually learning how much we do not know. But I certainly do not remember school being as much fun without computer programs like CCW's *Play With Language*.

Children's Computer Workshop, in case you do not know, is part of Children's Television Workshop, the group who produced Sesame Street and developed Sesame Place, the educational amusement park in Pennsylvania. As a matter of fact, the computer programs that CTW developed were originated at Sesame Place. Living about 10 minutes from Sesame Place, I can verify the statement in the introduction of the booklet that says, "Fifty-seven computer games are available . . .," my children and I have played most of them.

I think the three programs included in *Play With Language*, developed from the low-resolution, fairly simple games at the Park, are amazing. The 35 people listed under the titles of CCW's print development team and software development team deserve the credit for a job well done and I feel that it was honorable of CCW to list their names.

Play With Language is designed for elementary school use. This is not to say a family would not profit from the learning experiences; however, the format of the instruction booklet is definitely classroom oriented. The information begins by telling you that the program includes three language-arts learning modules. Each learning module contains the diskette, 10 reproducible worksheets, five activity cards, one gameboard and one poster describing how to play the activity. An extensive teaching guide states "... and ancillary materials to provide for individualization of instruction, child/computer/teacher interaction and an educational philosophy which encourages active participation in reading and writing." And this was in the first paragraph. Does this scare you? Would Cookie Monster refuse a chocolate chip cookie? The general information section begins with the word "Relax." The booklet is designed for the beginning computer user as well as the more experienced. The instructions are precise (and so easy to follow that Oscar the Grouch could not get mad). And in case you just unpacked your Color Computer for the first time, "Setting Up Your System" describes everything you need to know right down to which wire to plug into what connection.

The three, separate programs with the *Play With Language* series are: *Picture Place!*, *Roll-A-Word*, and mypersonal favorite, *Bagasaurus*. According to the instruction booklet all programs have the same affective and cognitive goals.

The affective goals are:

A) Students talk and exchange ideas with their peers and teacher as they interact with the computer.

- B) Students are involved in self-directed learning as they explore environments and think about information in new and different ways.
- C) Students have fun and enjoy their experiences with the computer, as they play the activity. The cognitive goals are:
- A) Students practice sight words and beginning vocabulary as they exchange words and their picture referents.
- B) Students practice making words in rhyme patterns and complete sentences in clever ways.
- C) Students practice several reading comprehension skills and create stories.

In addition, each program has an individualizing menu for the teacher called "Learning Manager"; a "Teaching Extensions" section in the booklet for additional classroom activities; a stand-alone "Gameboard" to use in the classroom with a group; and a "Dictionary" that lists all words in the program.

Picture Place! has 193 word-pictures and six background scenes. Each time the game is played, "... the computer randomly selects 24 words from a pool of 40 words associated with the chosen background scene." The student picks a word from a list of four words shown, hits the ENTER key, and using the joystick, moves the word-picture onto the scene. When the student feels that the proper location has been reached, the ENTER key is hit again and the word-picture is placed upon that spot. The bottom of the screen has a list of four words, the word "more" and the word "end." The joystick glides a rectangle across



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the screen for placement of the words on the scene or encircles individual words on the list to be chosen. When you encircle "more" you get the next list of words, if you encircle "end" you stop the program. It should be noted that the description I am giving you does not give justice to the excellent high-resolution stage scenes or to the superb machine language music used in the program. Picture Place! is designed so the teacher can develop special skills with short vowels, long vowels, blends, the silent 'e' rule and syllables. As with all the programs, the teachers can create their own lessons by choosing certain picture-words and saving them to a disk. Of course, the teacher can save each student's creation on a separate disk. As before, the instruction booklet is very precise in explaining each and every step. The "Teaching Extensions" section includes 10 activities that correlate with the program. In addition, there are five activity cards for the students. Each activity card is a 5" x 7" hard, glossy card that is designed to withstand classroom use. The "Gameboard" is a Monopoly-style game that is printed on glossy paper. It would probably be worthwhile to glue it down to a piece of cardboard for permanent use. Complete instructions are included in the booklet. The 10 reproducible handouts include a cartoon (for coloring), questions and an activity.

Roll-A-Word is a fascinating way to have students match beginning and ending sounds. The more complex version has the students using blends. A sentence is shown with blank spaces. By using the right and left arrows, pictures are moved across the top of the screen. When the student reaches a picture that matches the sentence, he uses the up and down arrows to roll the letters in the rectangle.

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Upon matching the letters to the proper picture the student hits the ENTER key. If correct, the picture either rides, flies or floats to the correct position on the sentence. If incorrect, he has to continue. It is as much fun rolling the letters and pictures as it is getting the right answer. As before, the program has a learning manager so the teacher can create other versions of the program. Student sentences can be saved to disk if desired.

There are also 10 "Teaching Extensions," five activity cards, and a gameboard. The Roll-A-Word dictionary is divided into word groups such as: "UG"; "bug, jug, rug, mug, plug".

I have never met such a lovable creature as Bagasaurus (or my subtile, "Heigh-Ho Din-O-saur"). In case you have never heard of a Bagasaurus, a short story describes that 100,000,000 years ago, when the ice age came, all the dinosaurs died off, except that one dinosaur egg (put in a blue paper bag by its parents) was saved! I am not one who ruins the great story by giving away the ending so you will just have to read the rest yourself. I will tell you that *Bagasaurus* travels around the world (in fantastic high resolution pictures) from Easter Island to Egypt and along the way he has to bag (as in Bagasaurus) words and images by correctly answering questions. The student uses the joystick to move and the ENTER key to collect the words. If incorrect, the Bagasaurus stomps his (I use the word "his" carefully as it may be "her" and I do not want a dinosaur to get mad at me) feet and shakes its head no. If correct he/she nods yes and takes the word or image. Sound effects are great! Each footstep, closer or further away, can be distinguished. Each nod, positive or negative, is different. Each screen provided a little different type of sound. "Heigh-Ho Din-O-saur!" There are 13 different scenes, 100 questions, 70 images, and 300 words. After correctly choosing a word or image to a question (Bagasaurus does not move on until you answer correctly) all chosen words are fitted into one of 50 different stories or poems. Throughout the story are underlined words and by hitting the ENTER key the student changes the story word with the word they chose with Bagasaurus. Vocabulary skills are developed with synonyms, antonyms, and multiple word meanings. Reading comprehension skills include classification, following directions and sequencing. Of course, there are 10 "Teaching Extensions," five activity cards, a "Bagasaurus Gameboard" and a dictionary. Highresolution graphics abound.

Something I did not mention about all these games; they are all non-resident. The disk must be connected all the time and the effect is excellent. All high-resolution pictures flow from one into the other. The music blends with the scene. Everything works perfectly.

With all I have written I bet you're wondering if I tried it out on some children. Of course, I let my children work with it. And yes, I sat back and observed their motivation and educational achievement and yes, it does what it says! My children, Jennifer, David and Michael loved it! They cooperated together in developing the programs, they learned the blends in Roll-A-Word, they made stories with Picture Place!, and they had Bagasaurus travel around the world to collect words and most important of all . . . they let me play with them.

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### Jungle Queen Seeks A Safari Hero

If real men don't eat quiche, it's just as unfortunate that real cannibals do eat people, and right now a group of them is adding a few vegetables, some garlic, and a little Accent to a stewpot of water rapidly heating up over a well-stoked fire. In the pot of water is our Jungle Queen, and if she is not rescued soon she will become a tasty dinner for the hungry cannibals.

But wait! In the distance a hunter on safari hears the Queen's cries for help. The area of jungle he is in is nearly impassable, so he leaps for a vine and swings from tree to tree, Tarzan-style. Suddenly the trees end and our hero encounters an alligator-infested river. He must swim across the river, avoiding and killing the alligators as he swims. He must also avoid large clusters of bubbles which can entrap him and limit his maneuverability, making him more susceptible to the hungry 'gators.

Once across the river, our hero is getting very close to the cannibal village. Some of the cannibals have discovered his presence and are rolling rocks and boulders at him as he attempts to climb the hill where they are cooking the Queen. After ducking and jumping the rolling and bouncing rocks, our intrepid rescuer arrives at the scene of the cookout where, in two mighty leaps, he jumps over the heads of the cannibal cooks and rescues his beloved

Queen (clap and cheer loudly!).

Jungle Queen, by Dave Shipka of ZOSO Software, is a good rendering of the arcade game Jungle Hunt. It has four screens; the swinging vines, the river crossing, the rolling stones and boulders, and the rescue of the Queen in the cannibals' cook pot. In higher levels, the swinging vines have monkeys on them trying to knock the hero off the vines. While the graphics do not set a new standard for excellence as did games like Zaxxon and Pyramid Adventure, they are good. My staff of assistant reviewers (three teen-aged sons and their friends) rated this as a good game and fun to play.

When I first received this game for review, I found that the tape did not stop running when the game was loaded. I also found an oversight in the documentation — it did not specify how to move the man through the screens, whether to use the joystick or the keyboard. I wrote to Dave Shipka about the problems, and in a few days a new tape and revised documentation arrived in the mail with both problems corrected. It looks like the buyer can expect good, prompt support in case of any problem.

The program is extremely long — it requires full 32K, so if you have a disk drive, by all means order the disk version.

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- James G. Kriz

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#### **Turn Of The Screw Correction**

In Tony DiStefano's column in the December 1984 RAINBOW, the last sentence on Page 28 is incorrect. It should read: "Next, take a little piece of wire and jumper Pin 20 to pins 2, 5, 6, 9, 12, 15, 16, and 19 — one at a time." Our thanks to Rodney Masten, of Macon, Mo., for catching this.

Additionally, the BASIC listing Tony mentions as an example program was inadvertently left out. The following routine will run four lights in a chase sequence. Use the up and down arrows to increase and decrease the speed of the chase:

16Ø POKE&HFF4Ø,1:GOSUB 25Ø:POKE& HFF4Ø,2:GOSUB 25Ø:POKE&HFF4Ø,4:G OSUB 25Ø:POKE&HFF4Ø,8:GOSUB 25Ø: GOTO 16Ø

25Ø A\$=INKEY\$:IF PEEK(341)=247 T HEN X=X+1ELSEIF PEEK(342)=247 TH EN X=ABS(X-1) 28Ø FOR I=Ø TO X : NEXT I:RETURN

The line below will turn four lights on and off randomly. Change (16) to (255) for an eight-light system.

380 POKE&HFF40, RND(16): SOUND R ND(100)+100, RND(5): GOTO 380

## **Key Tronic Keyboard Among The Best**

Even though Radio Shack has introduced a "real" keyboard on the CoCos made over the past few months. there still seems to be quite a bit of action on the replacement keyboard front. For one thing, there are still hundreds of thousands of older models in use, and they won't go away very quickly.

Key Tronic's KB-500 is a fairly recent entry into the field. It has some good features, but also some drawbacks compared with some other keyboards. Like most of the other replacement keyboards, this one is made by one of the major keyswitch manufacturers; Key Tronic makes keyboards for many of the IBM-compatible computers and a number of other systems as well, and they are probably best known for the replacement keyboards they sell for the IBM PC and PCjr systems.

The Key Tronic keyboard installs easily: it's not as easy to do as the Macrotron or Radio Shack units, since you have to cut off the center post, but like them (and unlike the HJL-57 and Mark Data Super Pro) it drops right onto the existing mounting posts just like the old keyboard did. The KB-500 comes with the "F board adapter" to plug into newer CoCos' keyboard sockets, and it works on all models including the CoCo 2. The instructions are reasonably clear and should cause no problem.

The KB-500 is guite similar to many of the "IBM clone" keyboards in that its keys are the same size and shape as the PC's keys and feel much the same, but without the characteristic "Selectric click" of the IBM PC keyboard. The layout is identical to that of the normal CoCo keyboard except that one function key has been added, in contrast to the four you get on an HJL or Macrotron unit. This key acts as PF1 if you are using software designed for either of those keyboards.

One interesting aspect of the Key Tronic keyboard's design is that it seems to be geared toward the person who mostly uses programs in BASIC. The specialized shiftedkey functions (caps lock, pause, delete line and brackets) are now marked on the keys themselves. (Radio Shack has been using SHIFT-0 as the caps lock key on the Model I and III as well as the CoCo for the past five years, but none of the machines has the key marked to indicate it.) Also, the BREAK and CLEAR keys — the two that will wipe out the program line you were typing - have heavier springs under them to keep them from being pressed accidentally. While this is great for BASIC, application programs will often use those keys for special purposes (Telewriter uses BREAK to delete characters and CLEAR for special editing functions), so you may have minor problems. It might be a good idea if Key Tronic would put two extra normal springs in the package so those who want to can restore either or both of those keys to normal and even protect other keys, if desired.

The only actual minus points I found (aside from the dull color scheme of gray alphanumeric keys and dark gray control keys) were the way the keytops stuck up from the surface, leaving a gap of about <sup>3</sup>/<sub>16</sub>-inch, and that Key Tronic copied the rather silly IBM practice of putting a small keytop in a large space with a "skirt" covering up the gaps (on the KB-500 the ENTER key is the only one so treated). I'd just as soon have a key that takes up the full space.

The Key Tronic KB-500 is a decent replacement for the CoCo's original keyboard, even if you have the new Radio Shack keyboard in your machine already. As I've said before, since the computer keyboard is such a personal thing, you might want to look at as many of the various replacements as you can before making your choice.

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- Ed Ellers

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## Semigraphics Support Combines Text And Graphics

By T. Gray

One drawback to the Color Computer is the difficulty of combining text and graphics. One way around this difficulty is *Semigraphics Support* (SGS) by Micro Computer Systems. This machine language programming utility meshes with Extended Color BASIC to provide medium-resolution graphics in nine colors plus black.

The result? You have 17 new commands and four new functions. You have easy access to single-bit and six-bit sound generation. You can use five new, full-color graphics modes, with Extended BASIC commands to draw circles, squares, and lines, fill them in, move them around, create animation, and label graphics with text.

There are a lot of good things on this disk (or tape). There are demonstration programs for 16K and 32K. These are interesting enough that I watched them through a couple of times before I even tackled the main program. The demos give you a good idea of what the program can do.

The "new" semigraphics modes are already in your CoCo, and are discussed in Section IV of Getting Started With Color BASIC. They provide resolutions from 32 x 16 (SG4 or alphanumeric internal, which CoCo normally uses to put

letters onscreen) to 64 x 192 (SG24). In order to access these modes, it is usually necessary to do a lot of *PEEKing* and *POKEing* around. Fortunately for me, *SGS* does not require an understanding of the hardware and its quirks.

The graphics commands are sensible, easy to remember, and similar in syntax to those of Extended BASIC. All are distinguished by a preceding 'S.' For example, SPIXL(x,y,c) sets a pixel located at (x,y) to color (c). The function A = SPIXT(x,y) is a pixel test; it returns the value (zero to eight) of the color of pixel (x,y). So much of this is familiar that—after you have spent a few hours puzzling it out—it is easy to use. There is SCIRCL for circles and ellipses. There is SLIN for lines and boxes (solid, dotted, and dashed) and for solid boxes. There is SFILL to paint, and SHIFT for easy simple animation. You can SKOPY one graphics page to another, or SMOVE graphics around the page.

The sound routines are just as handy. STONEA(f,e) gives you control over the single-bit sound routine. You can set the frequency delay (f) and the envelope delay (e). STONEB (f,e,v) gets you into the six-bit sound, where you can control the volume (v) as well. These two tones aren't as easy as PLAY but are fun to play with.

In fact, the author of the documentation seems determined to force you to play around in order to learn how to use the system. I'm not saying that the documentation is inadequate. The manual was nicely done and spiral bound. (It did what spiral bindings always do: it uncurled and dumped pages all over the floor. If looseleaf binders are too expensive to include in the package, just punch holes in the pages and I'll buy my own binder, thank you.)

No, the information is there, but the entire manual seems a bit backward. The full description of how to load



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(412) 744-2335 300 - 1200 Baud Modem Online FREE DIGITIZED PICTURES! the thing into various CoCos is found at the back. At the front is an incomprehensible command summary. As I worked through the commands, I kept running into other commands and terms that had not been previously covered. This made the concepts a little hard to pick up. By the time I had worked through the manual, the command summary wasn't quite so incomprehensible, but it shouldn't be one of the first things a user trips over. It was this aspect of the manual that made the program a bit hard to get involved with.

A nice feature of the manual is that there are dozens of sample programs showing you how to use the various commands and features of the program. Even those impressive demonstration programs are listed! Not only do these help you learn the system, they are a treasure trove of information that is missing from the main sections of the text. You pass over these sample programs at your peril.

For example, you can save your semigraphics pages to cassette or disk as ML programs. This is an important feature of the system that really should be given a main section in the manual. Instead, it sneaks into a sample program somewhere toward the back few pages.

One of the main selling features of the system is the ability to easily combine text with colorful medium-resolution graphics. It delivers, too, in three styles of text (orange, green, and inverse, the same as ECB). The graphics mode for which this is available is of about the same quality as set/reset graphics, but is far easier to use. This important feature is not even mentioned in the manual. It is hidden in one of the sample programs, waiting for you to discover it. The actual method of locating letters on the screen, while not difficult, is far from clear in the sample program.

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It will take you a bit of experimenting to sort everything out. This is all well and good, if you have the time. I'm sure it wasn't the author's intention to play guessing games with the user, but that's the way it comes out.

In addition to the major omissions of saving graphics and combining text with graphics, there were some minor missing pieces. I'd have appreciated having a few tables that weren't in the text:

- 1) summary of the commands and their syntax (the commands are summarized, but the syntax is buried in individual sections of text):
- 2) table of the maximum x and y values in each mode;
- 3) color code would be handy (it's the same as Color BASIC — 1=green, 2=yellow, etc. but I haven't memorized them);
- 4) since some commands are not available in some modes, a chart of this would be useful.

So there it is, a semigraphics support system that extends your Extended BASIC. Should you buy it? Well, it is easy to use once you get the hang of it. It does increase your capabilities when programming in BASIC. If you incorporate it into a program for sale, there is no license fee. It works with 16K, 32K, cassette, and disk. It comes with a pile of sample programs to help you get to know it better. It encourages, or insists on, exploration and experimentation.

(Micro Computer Systems, 1404 Sunset Drive, Friendswood, TX 77546, 16-32K ECB, cassette \$29.95, disk \$34.95)

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## **Explore The Universe And Rescue The Earth** In Trekboer

There's a deadly virus threatening the future of humankind in Trekboer - a new graphics Adventure by Mark Data Products - and your mission is to search the universe for a cure.

You are aboard the spaceship Trekboer as the Adventure begins, with a variety of buttons to push, doors to open, rooms to search, objects to collect, a tracking screen to watch and a robot that you will need to help you.

As in other Mark Data graphics Adventures, such as Calixto Island, Sea Search and Shenanigans, the visual effects in Trekboer are top-notch and of such quality that you will find yourself (again) in front of the computer during the early morning hours.

You have four planets to explore in your journey, each with its own unique environment and the inherent dangers you've come to expect from Adventure games. Be forewarned that you should be braced for some shocking discoveries because the virus has been claiming many lives.

You will need to watch your diet, too, until you discover how the disease is being transmitted. You will probably get thirsty along the way, but it's a good idea to have any liquids tested before indulging yourself.

If you find yourself in danger of being wiped out, or if it's just time to call it an evening, a SAVE feature allows you to retain the game at any point for later resumption. There's also a HELP feature, which I found to be of questionable value because it usually repeats advice given earlier. Directional commands are simplified by allowing you to enter the first letter of the direction in which vou want to proceed.

Mark Data has graciously provided maps and telecommunications aids, but first you will have to find them and, secondly, figure how they can best serve you. There is, of course, some guesswork involved, a lot of false starts, and logical steps that must be taken before you can utilize

You must be diligent in your search because there's no turning back to the home base unless you're willing to sacrifice your pride and/or the game. After all, the entire universe is counting upon you!

One of my first reactions was to the name of the Adventure game. Why in the world would the United States want to name a spaceship Trekboer? After thinking about it for a while, it occurs to one that the name could be a clue to the solution of the Adventure. Even then, you've got a way to go before reaching a satisfactory conclusion.

Like most Mark Data products I have experienced, Trekboer demonstrates the full potential of the Color Computer. The game is challenging, the options are many, the plot is sophisticated, the graphics exceptional, and the appeal is universal. If you're into Adventures, especially of the graphics variety, Trekboer is for you.

(Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, tape \$24.95, disk \$27.95.)

- Charles Springer

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## Speed Racer Offers Good Challenge For The Racing Enthusiast

Just when you thought the Color Computer had reached its full graphics' potential, along comes a program like MichTron's Speed Racer that makes you wonder just how much more we can extract from this incredible machine.

As you climb into the driver's seat, you are greeted by an opening screen that includes a CoCo and monitor (with motion picture-type credits) on a red and black checkerboard field. You know then and there you are in for something

You have a choice of four racecourses, ranging from the predictable rectangular shape to an S-shaped track, and others with a never-ending variety of hairpin turns and tempting straightaways.

You're off with a wave of a checkered flag! Just push your gearshift (right joystick) forward and you're rapidly pushing 200 miles per hour in the age-old quest for glory. Your speed is indicated in a nicely composed speedometer at the lower left of the screen. The object of Speed Racer is to pass the required number of cars for each lap, which is indicated by an arrow under a 'Cars Passed' marker at the lower right. You must reach this goal to progress to the next lap. Otherwise, the game is over. Complete all five laps (10 miles) and you win the race.

The real hazards of racing, of course, are the other cars in the race. You must manage to pass them without colliding or losing control, or you will be the latest fatality. Collisions are dramatically represented on the screen by a cloud of smoke and flying tires.

The competition is represented in true arcade fashion that rivals one of those packaged in a sit-down booth at the local video gathering place. It is the game that many

#### One-Liner Contest Winner . . .

This one-liner is best described as "Old Glory the easy way." It's a surprisingly good (for one line) reproduction of the Stars and Stripes.

> Ronald W. Wilson Franklin, OH

#### The listing:

1 PMODE1:PCLS:SCREEN1, Ø: DRAW"BMØ , ØR255D99L255U99BR5ØD5ØL5ØBU4ØBR 50R205D10L205D10R205D10L205D10R2 55D1ØL255D1ØR255D1ØL255D1ØR255": FORX=7TO42STEP11:FORY=9TO44STEP1 2: CIRCLE(X, Y), 4, 4: NEXTY: NEXTX: PA INT (3, 3), 3, 4: FORA=9TO89STEP2Ø: PA INT (52, A), 4, 4: NEXTA: GOTO1

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventure and its companion Rainbow Adventure Tape.)

CoCo lovers have envied for many months, secretly hoping that it would become available to us.

The action in Speed Racer is not quite as furious as the one in the arcade - you won't be running through any billboads, for example - but the level of challenge would rate an eight on a scale of one to 10. There are road signs, however, which warn you of impending curves ahead. If you hug the curve for too long, you'll probably blow a tire. That's the cue for the pit crew to show its speed in replacing them, an interesting spectacle.

There are separate high-score capabilities for each track for up to 10 games. The track is selected by moving the joystick from left to right.

The scenery in Speed Racer is as distracting as it is beautiful, ranging from big city skylines and mountain ranges to ocean scenes, complete with sailboats. One of my favorites is the one that includes a giant suspension bridge. Some people I know play the game as much for the scenery as for the thrills of racing.

The graphics in this game are as good as I've seen on any computer, without question. Let's hope this is one of many more to come from MichTron. This effort is indicative, I hope, of an even stronger emphasis on quality in what could be a whole new era of arcade games for the Color Computer.

(MichTron, 576 S. Telegraph Road, Pontiac, MI. 48053, cassette \$34.95, disk \$34.95)

Charles Springer

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#### **CORRECTIONS**

"The ABC Game" (September 1984, Page 157): James F. Taylor advises us that this program will not run as is in 16K. He suggests deleting the following remark lines:

1-10, 145-185, 275-305, 411-415, 461-464, 481-483, 561-565, 591-596, 681-685, 841-845, 911-915, 1001-1009

"The Trip" (August 1984, Page 90): Jacques Bourgeois tells us that a reader questioned his use of a minus sign in place of an equal sign in the statement IF RND (2)-1 THEN . . . in Line 222. He assures us that this unusual syntax does work properly in this instance.

"Pretty As A Picture" (May 1984, Page 137): Tom Szlucha states that there are a number of problems with the program, and sends along a corrected listing of the first 47 lines of the program. Here it is:

Ø CLEAR 500:AR=0:GOTO220:'DUMPFI X 9/18/84

1Ø AR=1:CX=Ø:PI=INT(PX/S+.5):FOR X=Ø TO255 STEPPX:P=S\*-X:F=Ø:B=Ø: FORY=191TOØSTEP-1

20 IFPPOINT(X,Y)=CL THEN 40 ELSE 80

3Ø GOTO 8Ø

4Ø IF F>Ø THEN 6Ø

5Ø IF B>Ø THEN GOSUB 16Ø

60 F=F+S:GOTO 100

7Ø IF B> Ø THEN 9Ø

8Ø IF F>Ø THEN GOSUB 17Ø

9Ø B=B+S

100 NEXT Y

11Ø IF B>Ø THEN GOSUB 16Ø

12Ø IF F> Ø THEN GOSUB 17Ø

13Ø PRINT#-2, "M"BD", "P

14Ø NEXTX

15Ø GOTO 18Ø

16Ø PRINT#-2, "R"+STR\$(B)+", "+STR

\$(CX):B=Ø:RETURN

17Ø PRINT#-2, "J"+STR\$(F)+", "+STR

\$(CX):F=Ø:RETURN

18Ø CLS: INPUT"ANOTHER COLOR Y/N"

:R\$:IF R\$="Y" THEN AR=1:GOTO290

19Ø PRINT#-2, "MØ, -1ØØ": PRINT#-2,

"A"

200 POKE 150,87:POKE65494,0

21Ø CLS:PRINT"FINISHED":END

220 CLS:PRINT"CGP-115 SCREEN DUM P":PRINT:INPUT"DRAW TEST PATTERN Y/N"; R\$

23Ø IF R\$="Y" THEN GOSUB 47Ø

24Ø PS=PEEK (&HB6)

250 PMODE PS

26Ø CLS: INPUT"PLOTTING SCALE 1X

OR 2X";S:IF S<1 OR S>2 THEN 260

27Ø S=INT(S)

28Ø IF PS=3 THEN PX=2 ELSE PX=1

29Ø CLS

300 IF PS=3 THEN PRINT"PMODE 3 C

OLORS

Ø=BLACK 1=GREEN

2=YELLOW

5=BUFF

6=CYAN

7=MAGENTA

3=BLUE 4=RED

8=ORANGE"

310 IF PS=4 THEN PRINT"PMODE 4 C OLORS Ø=BLACK

5=BUFF

1=GREEN"

32Ø PRINT:PRINT"BE SURE YOU INPU T COLOR WHICH IS COMPATIBLE WITH

SCREEN MODE""

330 PRINT: INPUT"COLOR TO SENSE"; CL: IF CL<Ø OR CL>8 THEN 33Ø

340 CLS:PRINT"0=BLACK

1=BLUE

2=GREEN

3=RED"

35Ø PRINT: INPUT"DRAW WITH WHICH COLOR PEN"; CP: IF CP<0 OR CP>3 TH EN 35Ø

36Ø IF AR=1 THEN PRINT#-2, "H":GO T043Ø

37Ø BD=(48Ø-192\*S)/2:CX=Ø

38Ø POKE 65495.1

39Ø POKE 15Ø,18Ø

400 PRINT#-2, CHR\$(18)

41Ø PRINT#-2, "MØ, -3ØØ\*S"

42Ø PRINT#-2,"I"

430 PRINT#-2, "C"CP

44Ø PRINT#-2, "M"BD", "STR\$(CX)

450 SCREEN1,0:PMODE PS,1

46Ø GOTO1Ø

This should be typed in after deleting everything before Line 470.

"Cooking With CoCo" (November 1984, Page 146): Colin Stearman passes along a note from a reader who says that Radio Shack's disk versions of EDTASM, Scripsit and Spectaculator (all of which use the Color TRSDOS operating system) use bytes 17 and 18 of the directory entry, which conflicts with the file creation date area used by his program. Dates are not put into the file when these programs create files and they should pose no real problem. Colin also cautions that files created by these programs should not be redated with the BASIC program on Page 148. This problem may also occur with future Radio Shack programs that use Color TRSDOS (which is supplied on each program disk in each package).

"Adding Auto Answer To Modem I" (November 1984, Page 19): Tony Sharp advises us that there may be a problem with installing his modification in the newer Modem IB, due to some changes in the circuit board. One difference that has been noted is that the voltage regulator is now called VR1 instead of U1.

"CC-Talk" (November 1984, Page 50): There was an error in production that misplaced part of two lines. Here they are in the correct form:

14Ø CLS: PRINTTAB(8) "BUFFER CONTE NTS": PRINTTAB(6) "spaceMORE/enter EXIT": PRINT 17Ø BB=TB:BE=&H7CFF' buffer star

t and end addresses



## **Finalizing** The Rainbow Checkbook

#### By Richard White **Rainbow Contributing Editor**

This is the "Beginners Issue" where we welcome all of you that have recently become proud owners of a CoCo and have joined the RAINBOW family of readers. We will mark the occasion with a bit of a celebration, for Rainbow Checkbook, Version 1.0 is complete, and the listing follows this column.

Over the past few months, I have been writing about the program as it developed. Both program logic and syntax have been discussed in their natural setting, a working program. One consequence has been the need to revise the code previously discussed and explain the reasons for the changes. Changes come about for two reasons. First, for a better idea. As the programmer works with a program, inadequacies become evident and revisions to fix these are installed. Second are the pure bugs.

bugs continue to be found in most programs. That's why I say Version 1.0

Even with extensive testing, obscure (Richard White has a long background

with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.)

is the first to be published and not the first one written. It is reasonably clean and should do most of the job that needs to be done. It is hardly a final version if such a version exists. Since a program continues to evolve with time, it should be organized to facilitate change. To me, that means defining specific program functions and assigning blocks of line numbers to these functions. I made a table of these functions at the start and have staved with it throughout.

"Version 1.0 . . . is hardly a final version . . . Since a program continues to evolve with time, it should be organized to facilitate change."

LINES	FUNCTION
1-9	Most Frequently used
	subroutines
10-99	Other subroutines
100-199	Enter items
200-299	Edit records and update
	balances
400-499	Strip cleared items to make
	updated current file
600-699	Print report
900-999	Tape and disk I/O
2000-2099	Initialization

2100-2199 Make new file 10000 Save program routine PCLEAR 1 routine 10100

Version 1.0 contains all the functions shown in the table in the line number blocks shown. Note that the most frequently used lines go to the beginning of the program and the least used lines to the end. Each time there is a GOSUB or GOTO, BASIC starts at the beginning of the program to search for the required line. It makes no sense for it to have to continually search over lines that are used only once during the normal operation of the program. So, all initialization goes to the end rather than the beginning of the program where you will see it many times. On the other hand, frequently called subroutines should be at the beginning where BASIC can quickly find them. And, the smaller the line number, the fewer bytes it takes to store the subroutine call. In any case, I like small line numbers. They are easier to remember. I also see no need to keep increments of 10 between line numbers as you can see from the listing.

Another word of advice to the beginner. If you organize your program from the beginning, you will not need to renumber it. RENUM will destroy all the structure you carefully developed

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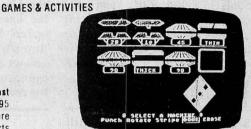
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and make trouble-shooting much more difficult. There is a place for RENUM— it is useful to make a user version of a program, numbered at increments of one. This both shortens the program and speeds it a tad. But, keep your structured source version for editing and upgrading. Renumbering the listing to increments of one saves 84 bytes in spite of the fact that I had already reduced memory usage by putting the subroutines at the beginning.

A good program today should be as self-documenting as possible. Still, some words of wisdom are generally needed to get the user off on the right foot. Perhaps the best place to start is to explain why the program was written in the first place. You see, there was this pile of bank statements on my desk about six months' worth. Reconciling the checkbook to the bank statements is a pain and the program I wrote way back when did not do that. I looked at the old program, but it was written before I discovered structuring a BASIC program. Starting from scratch looked easier. The real celebration came vesterday when I worked down through the (now nine months') pile, finding less than \$100 worth of mistakes. It's a relief to know that there will be no OM (out of money) messages from the bank.

The easiest way for you to get up and running with Rainbow Checkbook is to buy a Jan. 1985 RAINBOW ON TAPE. As published, the program runs in a 16K tape-based Extended BASIC machine. Those with disk drives should have 32/64K machines or be willing to cut some of the code out. For example, you might make two versions, one without the printer block starting at 600 and one without the editor and Newmonth routines starting at 200 and 400. This way you can enter and edit data with one version, save the file, and load the other version to print the file.

If you have been typing the program in with me over the last few months, check your code against the listing. There have been a number of changes, both added features and debugs.

When you load and run the program, you are shown the first menu that offers IOAD FILE or nEW FILE options. Choose new file by keying 'N'. You are now prompted for account information including name, bank, account number and date. You are then asked for your last bank statement balance. This is what the bank thinks your balance is and not what is shown in your checkbook. Since there are always some

outstanding items in your checkbook that the bank does not know about, the bank's balance must be different from any shown in your checkbook. Now you enter all the outstanding items in your checkbook. Your options are shown in the lines at the bottom of the entry screen. You can scroll back and forth through your file using the up and down arrows and edit entries. However, you cannot add items or make changes from the review mode.

"A correction entry allows you to adjust your balance without changing the calculated bank balance. It's a way to fudge your balance to match what the bank says you have."

When all items are entered, exit by keying 'S' to get to I/O routines. Here you can save to tape, disk or printer. If you do print your file, you will be returned to the normal input screen where you can key 'S' again to save your file to tape or disk. I use the name CURRENT and let BASIC append the default disk extension DAT. The next time you enter the program choose 'L' to load your file.

The input screen is nearly the same as New-file except a CLEAR function has been added. When you get a bank statement, first make sure that all items in your checkbook are in your current file. Next, go through your checkbook, check off all items that have cleared the bank and correct any entry errors. Now, load your current file and step back through it using the up-arrow key. Compare each entry in the file with that in your checkbook. If an item has been cleared, key 'C' and the calculated bank balance will be adjusted, then the status letter will change from 'O' to 'C'. If you clear an item by mistake, key 'C' again to toggle back to 'O' status. If you find mistakes in the file, key 'E' to get to edit mode to make the correction.

Warning! Never edit a cleared item. The program does not adjust the bank balance for changes made in the edit mode. If you need to edit a cleared item, first toggle it back to 'O', edit it and then toggle the status back to 'C' from input.

In edit mode you can change the check number, key 'N' then the new number, change an entry to adjustment or deposit, key 'A' or 'D', or change an adjustment to a correction. For a correction key 'C'. Correction does not show on the command line since it was a very late (read yesterday) addition. A correction entry allows you to adjust your balance without changing the calculated bank balance. It's a way to fudge your balance to match what the bank says you have. Note that you cannot enter a correction directly from the input mode. Rather, enter an adjustment and edit the entry to the correction type.

When you enter a check, enter it as a positive number and the program automatically deducts the amount from your checkbook balance. A deposit is automatically added to the balance. An adjustment may be either positive or negative. An interest credit should be entered as a positive number since it increases your balance. Service charges should be entered as negative numbers.

In input mode, you can duplicate the previous entry, like the date, simply by hitting ENTER for that field. The same happens in edit, so you only key in entries for fields you need to change. When you leave edit, you are returned to input, but at the end of the file. Already I see a number of changes for *Version 2.0*.

When you have corrected your file and cleared all items that have cleared the bank for the month, your bank balance from the program should match that shown on the statement. When it doesn't (to err is human, it's not the computer's fault), look for errors both in your current file in the program and for errors in your checkbook. A printout is very handy here. Key 'S' to get to the Save Menu, then 'P' for the Printer. Change the Baud rate, if necessary, by hitting ENTER and then keying in the rate you want. Next, use the down-arrow to move the cursor next to PRINT and press ENTER. The program will print the account information, allow you to update the date if necessary and then list the current file. When all is right, print a copy of the current file to store with the checks and bank statement for the month.

Finally, you will want to use the Newmonth routine to strip all cleared items out of the current file to a tape or disk archive file. This routine saves a file of cleared items that you might title JAN85 or JAN85/CLR for disk. It also

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Separate Text & Graphics	Yes	Yes	No	
Print @ fully implemented	Yes	Yes	Yes	
Print @ on all line lengths	Yes	Yes	51 only	
Different line lengths		)28 to 255 (9)	51 only (1)	
	Yes	Yes (9)	Yes (1)	
Automatic Key Repeat	Yes	No	No	
Adjustable Key Repeat	Yes			
Auto Repeat Disable		No	No	
Erase to end of line/screen	Yes	Yes	Yes	
Home Cursor	Yes	Yes	Yes	
Solid or Blinking Cursor	Yes	No	Yes	
CLS command supported	Buff/Biack	Buff/Black	Buff/Black	
X,Y Coordinate Cursor				
Positioning	Yes	Yes	No	
Double Size Characters	Yes	Yes	No	
Individual/Continuous				
Highlighting	Yes	Yes	No	
On Screen Underlining	Yes	Yes	No	
Clear Key functional	Clear/L key		No	
16.32 & 64K Supported	Yes	Yes	Yes	
Green or Black Background	1 65			
Color	Yes	No	No	
Dual Character sets for	163	110	110	
Enhanced 64 and 85				
Characters per line display	Vac	No	No	
Protected Screen Lines	1 62	INO	140	
	1 to 23	No	No	
(programmable)	1 10 2.5	140	140	
Full Control Code Keyboard				
for Screen control directly	11	N1	No	
from the keyboard	Yes	No	INO	
Programmable Tab Characte		N.	NI	
Spacing	Yes	No	No	
Full Screen Reverse Function		Yes	No	
Switch to & from the Standard	d			
16 by 32 Screen for full			53.	
compatability	Yes	No	No	
On Error Goto Function	No	No	Yes	
Extended Basic Required	No	Yes	Yes	
All Machine Language Progran	nYes	Yes	Yes	
RAM Required in addition to				
Screen RAM	2K	2K	2K	
Program Price (Tape)	\$24.95	\$19.95	\$29.95	
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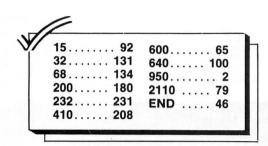


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saves the full current file with the extension BAK if you are on disk. If you loaded the file from tape, Newmonth saves to tape. The same applies with disk. Finally, New-month strips all cleared items from your current file and returns you to input. At this point you should save this new current file.

Newcomers to RAINBOW should know that this month's "Bits and Bytes of BASIC" is different from normal in that I did not discuss any BASIC code. Next month we will resume our line by line discussion of the program. I will

take up the printer code first and show some do's and don'ts in making BASIC print a formatted, multi-page report. In the meantime, do some testing of Rainbow Checkbook. Suggestions for improvements to go into Version 2.0 may be sent to me care of THE RAINBOW.



#### The listing:

Ø GOT01Ø1ØØ

1 PRINTCHR\$(191);:I\$=INKEY\$:IFI\$ =""THENFORX=ØTO5:NEXT:PRINTCHR\$( 8);:GOTO1ELSEPRINTCHR\$(8);:RETUR N

2 F=INSTR(F1,A\$(V),"\$"):RETURN

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4 PRINT:PRINT"current date: ";DA

5 LINEINPUTI\$: IFI\$<>""THENDA\$=I\$ : RETURNELSERETURN

1Ø LC\$=CC\$:LD\$=CD\$:LA=CA:LB=CB:L S\$=CS\$: LN\$=CN\$

11 PRINT@96, USINGS4\$; LC\$; : PRINT"

"LD\$:PRINT@108,USINGSS\$;LA:PRI NT@119.USINGSS\$; LB; : PRINTSTRING\$ (63,32);:PRINT@128,USINGSN\$;LS\$; :PRINTLN\$:RETURN

12 F1=1:V=CR-1:GOSUB2:LC\$=MID\$(A \$(V),F1,F-F1):F1=F+1:GOSUB2:LD\$= MID\$(A\$(V).F1.F-F1):LS\$=MID\$(A\$(V),F+1,1):LN\$=MID\$(A\$(V),F+3,LEN  $(A$(V))-F+3):LA=A(V,\emptyset):LB=A(V,1)$ : RETURN

14 CC\$=LC\$:CD\$=LD\$:CA=LA:CB=LB:C S\$=LS\$:CN\$=LN\$:IFF1=2THENRETURN 15 PRINT@PS.USINGS4\$; CC\$; :PRINT"

"CD\$:PRINT@PS+12,USINGSS\$;CA:P RINT@PS+23, USINGSS\$; CB; : PRINTSTR ING\$(63,32);:PRINT@PS+32,USINGSN \$; CS\$;: PRINTCN\$: RETURN

16 F1=1:V=CR:GOSUB2:CC\$=MID\$(A\$( V), F1, F-F1): F1=F+1: GOSUB2: CD\$=MI D\$(A\$(V),F1,F-F1):CS\$=MID\$(A\$(V) ,F+1,1):CN\$=MID\$(A\$(V),F+3,LEN(A \$(V))-F+3):CA=A(V,Ø):CB=A(V,1):R ETURN

17 IFCR>1THENCR=CR-1:GOSUB14:GOS UB12: GOSUB11: RETURNEL SERETURN 18 IFCR<LR-1THENCR=CR+1:GOSUB10: GOSUB16: GOSUB15: RETURNELSEGOSUB1 Ø:PRINT@224,STRING\$(95,32):FG=Ø: IFCR<LR THENCR=CR+1:RETURNELSERE TURN

22 IFIs=CHRs(13) THENCC=CC+1:CCs= STR\$ (CC): CC\$=RIGHT\$(CC\$, LEN(C C\$)-1):PRINT@224,USINGS4\$;CC\$:RE TURN

24 IFVI>ØTHENPRINTUSING"#";VI;:L INEINPUTI\$: CC\$=STR\$(VI)+I\$: CC\$=R IGHT\$(CC\$,LEN(CC\$)-1):CC=VAL(CC\$ ): RETURN

26 CC\$="DEP":PRINT@224.CC\$;:RETU RN

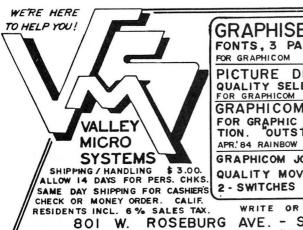
28 CC\$="ADJ":PRINT@224,CC\$;:RETU RN

29 CC\$="CORR":PRINT@224,CC\$;:RET URN

30 PRINT@229,"";:LINEINPUTI\$:IFI \$<>""THENCD\$=I\$ 31 PRINT@229,USING"% "," CD\$ 32 PRINT@236, "";: IFFG<>1THENLINE INPUTI\$: I=VAL(I\$): IFI<>ØTHENCA=I ELSEELSECA=Ø 34 PRINT@236, USINGSS\$; CA; : RETURN 36 IFVAL(CC\$)=ØTHENCB=CB+CA ELSE CB=CB-CA 37 PRINT@247, USINGSS\$; CB; : PRINTU SINGSNs; CSs;:LINEINPUTIs: IFIs<>" "THENCN\$=I\$ELSECN\$=" " 38 A\$(CR)=CC\$+"\$"+CD\$+"\$"+LEFT\$( CS\$,1)+"\$"+CN\$:A(CR,Ø)=CA:A(CR,1 ) = CB: RETURN 40 CR=CR+1:LR=CR:GOSUB10:PRINT@2 24.STRING\$ (95.32):FG=Ø:RETURN DATE 50 PRINT@8,RC\$,"ITEM A BALANCE": RETURN 52 PRINT@352, "LAST BANK BALANCE ";:PRINTUSINGSS\$;BB:RETURN 54 PRINT@384, "<ENTER> =NEXT CHEC K #", "1ST DIGIT STARTS NEW # SER IES": RETURN 56 PRINT@448, "dEPOSIT aDJUSTMENT vOID cLEARED eDIT save 10AD nEW MONTH "CHR\$ (94) "'S"; : RETURN 58 PRINT@448, "dEPOSIT aDJUSTMENT vOID", "eDIT save"CHR\$(94)"'S";: RETURN 6Ø GOSUB22:GOSUB3Ø:GOSUB36:GOSUB 40: RETURN 62 GOSUB26:GOSUB30:GOSUB36:GOSUB 40: RETURN 64 GOSUB28:GOSUB30:GOSUB36:GOSUB 40: RETURN 66 I \$=CHR\$ (13): GOSUB22: FG=1: GOSU B3Ø: GOSUB36: FG=Ø: GOSUB4Ø: RETURN 68 PRINT@32Ø, "REVIEW ENTRIES ";:P0=335:FG=1:GOSUB17:RETU

100 CLS:PS=224:GOSUB50:GOSUB52:G

OSUB54: GOSUB56: PRINT@128, STRING\$ (192,32):CR=LR:GOSUB12:GOSUB11:F 1=2:GOSUB14:F1=Ø:CC=VAL(CC\$) 110 PRINT@320, "ENTER OUTSTANDING "::P0=224 ITEMS 12Ø PRINT@PO, "";:GOSUB1:VI=VAL(I \$):IFFG=ØAND(VI>ØOR I\$=CHR\$(13)) GOSUB60: GOTO120 130 J=INSTR(1,"DAVCESLN"+CHR\$(94 )+CHR\$(10), I\$): IFFG=0THENONJ GOS UB62,64,66,160,200,900,950,400,6 8,18ELSEONJ GOSUB2160,2160,2160, 160,200,900,950,400,17,18 14Ø IFJ>4 ANDJ<9THEN1ØØ 15Ø IFCR=LR THEN11ØELSE12Ø 16Ø IFCS\$="O"THENCS\$="C":GOSUB15 :GOSUB38:IFLEFT\$(CC\$,4)<>"CORR"T HENIFVAL (CC\$) = ØTHENBB=BB+CA ELSE BB=BB-CA ELSEELSE17Ø 165 PRINT@371, ""; : PRINTUSINGSS\$; BB;:PRINT@343,"";:RETURN 17Ø CS\$="O":GOSUB15:GOSUB38:IFLE FT\$(CC\$,4)<>"CORR"THENIFVAL(CC\$) =ØTHENBB=BB-CA ELSEBB=BB+CA 175 PRINT@371,"";:PRINTUSINGSS\$; BB;:PRINT@343,"";:RETURN 200 CLS:GOSUB50:PRINT@72, "UNEDIT ED ENTRY": PRINT@201, "EDITED ENTR Y":PRINT@321, "TYPE FIELD ENTRY C ORRECTION", " <enter> FOR NEXT FI ELD": IFFG=1THENTF=1:FG=Ø 21Ø I \$= INKEY \$: PS=96: GOSUB16: GOSU B15:PRINT@224,STRING\$(95,32);:PR INT@416, "nEW #, dEP, aDJ, -=DELE TE, +=ADDUP/DOWN ARROWS, rETURN ";:PS=224:CT\$=CC\$:TA=CA 215 GOSUB1:IFI\$=CHR\$(13)THENPRIN T@224,CC\$;:GOTO24ØELSEJ=INSTR(1, "NDA-+R"+CHR\$(94)+CHR\$(10), I\$):0 NJ GOSUB220,26,28,225,230,217,23 5,237 216 IFFG=1THENFG=0:GOTO210ELSEIF I\$<>"R"THEN: GOTO24@ELSEFG=TF



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```
217 RETURN
22Ø PRINT@224, "";:GOSUB1:VI=VAL (
I$):IFI$="A"THENGOSUB28ELSEIFI$=
"C"THENGOSUB29ELSEGOSUB22
221 RETURN
225 FORX=CR TOLR-2: A$(X)=A$(X+1)
:A(X,\emptyset)=A(X+1,\emptyset):IFVAL(CC*)>\emptyset THE
NA(X,1)=A(X+1,1)+CA:CB=CB+CA ELS
EA(X,1)=A(X+1,1)-CA:CB=CB-CA
227 NEXT: PRINT@96, STRING$ (95, 32)
;:CC$="":CD$=""::CA=Ø:CS$="":CN$
="ITEM DELETED":CR=CR-1:LR=LR-1:
FG=1:RETURN
23Ø CC$=" ":CD$=" ":CS$=" ":CA=Ø
:TA=Ø:CN$="MAKE NEW ENTRY":FG=1:
FORX=LR TOCR+1STEP-1:A$(X)=A$(X-
1):A(X,\emptyset) = A(X-1,\emptyset):A(X,1) = A(X-1,

    1):NEXT:CB=A(X-1,1):LR=LR+1:GOSU

232 PS=96:GOSUB16:GOSUB15:PRINT@
416, "nEW #, dEP, aDJ, -=DELETE":
PRINTSTRING$ (28, 32); :PS=224:GOSU
B1:FG=Ø:J=INSTR(1, "NDA-", I$):ONJ
 GOSUB22Ø, 26, 28, 225
234 IFJ>ØTHEN24ØELSE232
235 FG=1:IFCR>1THENCR=CR-1:GOSUB
16: PS=96: GOSUB15: PS=224: RETURNEL
SERETURN
237 FG=1:IFCR<LR-1THENCR=CR+1:GO
SUB16: PS=96: GOSUB15: PS=224: RETUR
NELSERETURN
24Ø PRINT@416, STRING$ (45, 32):GOS
UB3Ø: IFVAL (CT$) = ØTHENIFVAL (CC$) =
ØTHENTA=CA-TA: GOTO242ELSETA=-TA-
CA: GOT0242
241 IFVAL(CC$)=ØTHENTA=TA+CA ELS
ETA=TA-CA
242 PRINT"TA"TA, "CA"CA;:FORX=1TO
2000:NEXT: FORX=CR TOLR-1:A(X,1)
=A(X,1)+TA:NEXT:CB=A(CR,1):PRINT
@247, USINGSS$; CB; :LINEINPUTI$: IF
I$<>""THENCS$=I$
244 PRINT@256, USINGSN#; CS#;:LINE
INPUTI$: IFI$<>""THENCN$=I$
246 PRINT@259, CN$: GOSUB38: GOTO21
400 CLS:PRINT@8,RC$,"
                          STRIP &
SAVE CLEARED ITEMS",,,,,TAB(8)"t
APE",,,,TAB(8)"dISK",,:GOSUB1:IF
I = "D"THEND=1ELSEIFI = "T"THEND=-
1ELSE4ØØ
410 PRINT:PRINT:IFD=-1THENPRINT"
  TAPE FILE"ELSEPRINT" DISK FIL
415 PRINT:PRINT"FILENAME";: IFD=1
THENPRINT" AND EXTENSION"
42Ø LINEINPUTCF$:GOSUB4:CT=Ø:FOR
CR=1TOLR-1:GOSUB16:IFCS$="C"THEN
```

```
425 OPEN"O", D, CF$:PRINT#D, CT+1:P
RINT#D, BB: PRINT#D, CB: PRINT#D, AN$
:PRINT#D, BA$:PRINT#D, AC$:PRINT#D
,DA$:FORCR=1TOLR-1
43Ø GOSUB16: IFCS$="C"THENPRINT#D
,A$(CR):PRINT#D,A(CR,Ø):PRINT#D,
A(CR, 1): NEXTELSENEXT
435 CLOSE:CT=Ø:OPEN"O",D,NM$+"/B
AK":PRINT#D,LR:PRINT#D,BB:PRINT#
D, CB: PRINT#D, AN$: PRINT#D, BA$: PRI
NT#D, AC$: PRINT#D, DA$: FORX=1TOLR-
1:PRINT#D, A$(X):PRINT#D, A(X,Ø):P
RINT#D, A(X, 1): NEXT: CLOSE
440 CLOSE:CT=0:FORCR=1TOLR-1:GOS
UB16: IFCS=="O"THENCT=CT+1:A=(CT)
=A$(CR):A(CT,\emptyset)=A(CR,\emptyset):A(CT,1)=
A(CR, 1): NEXTELSENEXT
445 FORX=CT+1TOLR-1:A$(X)="":NEX
T:LR=CT+1:CR=CT:RETURN
600 'TARGET LINE
605 BP=PEEK(150):BU=INSTR(1,"16*
18**41******87****************18Ø"
,RIGHT$(STR$(BP),LEN(STR$(BP))-1
)):BU=96ØØ/BU
605 POKE65494,0:BP=PEEK(150):BU=
INSTR(1,"16*18**41*****87*****
*******180", RIGHT$(STR$(BP), LEN
(STR$(BP))-1)):BU=9600/BU
61Ø CLS:PRINT@137, "PRINT ROUTINE
         CURRENT BAUD RATE ="BU
,TAB(6) "RESET BAUD RATE",,,"
PRINT",,,," RETURN":CT=1
615 CT$=RIGHT$(STR$(CT),1):LP=IN
STR(1,"
             1 2 3",CT$):LP=LP*3
2+2:PRINT@LP, ">";:GOSUB1:PRINT@L
P," ";: IFI = CHR + (10) ANDCT < 3THENC
T=CTT+1:GOTO615ELSEIFI$=CHR$(94)
ANDCT>1THENCT=CT-1:GOTO615ELSEIF
I$<>CHR$(13)THEN615ELSEONCT GOTO
620,630,100
620 PRINT" ";: INPUT"ENTER NEW BA
UD RATE"; BU$: BU$=LEFT$(BU$, 1): BL
=INSTR(1,"361249",BU$):IFBL=ØTHE
NPRINT"baud rate error": SOUND100
,50:GOTO605
625 BU(1)=180:BU(2)=87:BU(3)=41:
BU(4)=18:BU(5)=6:BU(6)=1:BU=BU(B
L):POKE15Ø,BU:GOT06Ø5
630 CLS: PRINT@96, "SET PRINTER AN
D PAPER AND PRESS any key. ": GOSU
B1:FORX=1T03:PRINT#-2," ":NEXT:P
RINT#-2, TAB(8) "ACCOUNT NAME:
ANS:PRINT#-2, TAB(8) "BANK NAME:
    "BA$: PRINT#-2, TAB(8) "ACCOUNT
NUMBER: "AC$
64Ø GOSUB4:PRINT#-2, TAB(8) "DATE
PRINTED:
             "DA$:PRINT#-2," ":P
RINT#-2, TAB(8) "CALCULATED BALANC
```

E AT BANK ="BB:PRINT#-2," ":PRIN

CT=CT+1:NEXTELSENEXT

T#-2, TAB(8) "CHECK# DATE MOU BALANCE STATUS NOTE": PRINT #-2," ":PG=13 650 FORCR=1TQLR-1:GOSUB16:PRINT# -2, TAB(9)"";:PRINT#-2, USING"% % ";CC\$;:PRINT#-2,USING" % D\$;:PRINT#-2,TAB(22)"";:PRINT#-2 ,USINGSS\$;CA;:PRINT#-2,TAB(32)"" ;:PRINT#-2,USINGSS\$;CB;:PRINT#-2 "CS\$" 655 PG=PG+1:IFPG>61THENFORX=1T07 :PRINT#-2," ":NEXT:PRINT#-2, TAB( 8) "CHECK# DATE AMOUNT STATUS NOTE":PRINT#-2," ":PG=5 66Ø NEXT:FORX=PG TO67:PRINT#-2," ": NEXT: RETURN 900 CLS:PRINT@8,RC\$," SAVE OR PRINT DATA",,,,,TAB(8)"tAPE", ,,,TAB(8)"dISK",,,,TAB(8)"pRINTE R":GOSUB1:IFI\$="D"THEND=1ELSEIFI \$="T"THEND=-1ELSEIFI\$="P"THEN600 ELSE9ØØ 905 GOSUB4 910 GOSUB985: OPEN"O", D, NM\$: PRINT #D, LR: PRINT#D, BB: PRINT#D, CB: PRIN T#D, AN: PRINT#D, BA: PRINT#D, AC: PRINT#D.DA\$: FORX=1TOLR-1: PRINT#D ,A\$(X):PRINT#D,A(X,Ø):PRINT#D,A( X, 1): NEXT: CLOSE: RETURN 950 CLS:PRINT@8,RC\$, TAB(11) "LOAD DATA",,,,,TAB(8) "tAPE",,,,TAB(8 ) "dISK": GOSUB1: IFI = "D"THEND=1EL SEIFI\$="T"THEND=-1ELSE950 96Ø GOSUB985:OPEN"I", D, NM\$: INPUT #D, LR, BB, CB: LINEINPUT#D, AN\$: LINE INPUT#D.BA\$:LINEINPUT#D,AC\$:LINE INPUT#D, DA\$: GOSUB970: FORX=1TOLR-1: INPUT#D, A\$(X): INPUT#D, A(X,Ø): I NPUT#D, A(X, 1): NEXT: CLOSE 962 CR=1:GOSUB16:IFVAL(CC\$)=ØTHE  $NA(\emptyset, 1) = A(1, 1) - A(1, \emptyset) ELSEA(\emptyset, 1) =$ A(1,1)+A(1,0) 965 PRINT:PRINT"PRESS ANY KEY TO CONTINUE ": GOSUB1: RETURN 970 CLS:PRINT@98, "FILENAME= "NM\$ :PRINT:PRINT" ACCOUNT INFORMATI ON": PRINT: PRINT "NAME: "ANS: PRINT "BANK: "BA\$:PRINT"ACCT #: "AC\$:P RINT"FILE UPDATED: "DA\$: RETURN 985 PRINT: IFD=-1THENPRINT"TAPE F ILE"ELSEPRINT"DISK FILE" 990 PRINT:PRINT"FILENAME":: IFD=1 THENPRINT" AND EXTENSION: ", NM\$E LSEFRINT": "NM\$ 995 LINEINPUTI\$:IFI\$<>""THENNM\$= I : RETURNELSERETURN 2000 CLEAR3500:DIMA\$(100),A(100. 2050 RC\$="RAINBOW CHECKBOOK":SS\$

="##, ###. ##": SN\$="% %": CR=1: LR=1 :54\$="% "":CS\$="0":A\$(Ø)=" \$ \$ \$FIRST ENTRY BELOW" 2100 CLS:PRINT@2, "rainbow checkb ook version 1.0":PRINT@47, "BY":P RINT@73, "RICHARD WHITE": PRINTTAB (7) "COPYRIGHT (C) 1984": PRINT: PR INT: PRINTTAB(8) "10AD FILE": PRINT :PRINTTAB(8) "nEW FILE" 2110 GOSUB1: IFI \$= "L"GOSUB950: GOT 0100ELSEIFI\$<>"N"THEN2110 2115 CLS:PRINT@96." enter accoun t name":LINEINPUTANs:PRINT:PRINT enter bank name":LINEINPUTBAs: PRINT: PRINT" enter account #":LI NE INPUTACS 2120 CLS:GOSUB50:PRINT:PRINT:PRI NT"ENTER LAST BANK STATEMENT BALANCE ";:LINEINPUTI\$:BB=VA L(I\$):PRINT@128,STRING\$(64,32):P RINT@128, "note: REPORTED CHECKB OOK BALANCE WILL NOT MATCH BALANCE UNTIL OUTSTAND YOUR ING" 2125 PRINT"CHECKS, CHARGES, DEPO AND CREDITS AT STATEMENT TIME ARE ENTERED. "; : GOSUB1: CB =BB: GOSUB52: GOSUB54: GOSUB56: PRIN T@128, STRING\$ (192, 32) 2130 PRINT@320, "ENTER OUTSTANDIN ";: PO=224:PS=PO G ITEMS 2140 PRINT@PO, "";:GOSUB1:VI=VAL( I\$):IFFG=ØAND(VI>ØOR I\$=CHR\$(13) ) GOSUB60: GOTO2140 215Ø J=INSTR(1, "DAVES"+CHR\$(94)+ CHR\$(10), I\$): IFFG=0THENONJ GOSUB 62,64,66,200,900,68,18ELSEONJ GO SUB2160,2160,2160,200,900,17,18 2155 IFJ=5 THENGOTO100 2157 IFCR=LR THEN213ØELSE214Ø 2160 RETURN 10000 SAVE"RNBWCKBK 10100 PCLEAR1:GOTO2000 20000 FORX=0TO64:PRINT@X,CHR\$(32 +X):PRINT@X+96,CHR\$(PEEK(1024+X)

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## The 6809 Instruction Set — Zeroing In On 'The Real Thing'

By R. Bartly Betts **Rainbow Contributing Editor** With Programs By Chris Bone

am sure you are finger-weary if you typed in all of last month's listing by hand. You deserve a treat and I hope we will have one for you this month.

I think we are almost through the painful part and about ready to have fun. There is still a lot of work to be done, but the work is a lot sweeter when something worthwhile is being accomplished. With the information you now have learned about registers, we can begin on the real thing, the 6809 instruction set.

You have already been using several of the instructions recognized by your assembler. This month you will begin taking a closer look at these instructions, what they do and how to use them.

A great start toward understanding your assembler's instructions is knowing how to interpret the instruction set reference in your assembler manual and the references in other 6809 assembly language programming books. The EDTASM+ manual seems like a good place to begin. I have the one that came with my cartridge pack, Radio Shack Cat. No. 26-3250. The instruction set references start on Page 39. Page 37 has a section on definition of terms and Page 38 explains the abbreviations used in the set. It will be helpful to refer to these pages when you run up against definition problems. You are probably most familiar with the LD (load) instruction (pages 44 and 45 in my manual). Regardless of what assembler you use, the reference should look something like the following:

LD

Load Register from Memory

Source Forms: LDA P; LDB P Operation: R'<--M Condition Codes:

- H -Not affected
- N -Set if the loaded data is negative; cleared otherwise
- Z -Set if the loaded data is zero; cleared otherwise
- V -Always cleared
- C -Not affected

Description: Loads the contents of memory location M into the designated register.

Addressing Modes: Immediate; Extended; Direct; Indexed.

If you take a close look at this instruction, it will provide a basis from which to understand the rest of the instruction set.

First, notice that the reference I typed in is one of two for the LD instruction. This one is labeled as "8-BIT." This instruction is only 8-bit because it only uses registers A and B, both 8-bit registers. You will recall from your study of binary numbers that the maximum value an 8-bit number can contain is 255. If you want to handle numbers larger than 255, you will have to use the 16-bit form of the LD instruction. Actually, the only difference between the two forms of the load instruction is that the 8-bit instruction uses registers A and B while the 16bit form uses registers X, Y, S and U.

The information about what registers are used in what way is found in the line "Source Forms." The italic 'P' in the line represents a memory location, such as:

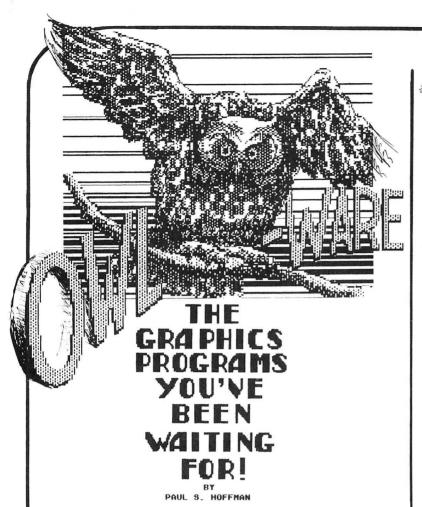
LDA 32

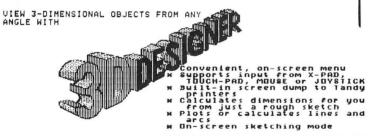
where A is the register to be loaded and 'P' is memory location 32.

The line beginning with "Operation:" tells you that a register after the LD operation (R'), has been loaded with a value from memory (M). The arrow in the line indicates the direction of the data flow.

The lines following "Condition Codes:" indicate the effect that the operation has on the five condition code flags. At this point you need not worry about them, their function will become clear in later columns.

(Bartly Betts is a former reporter, magazine editor and store owner now residing in Fort Worth, Texas. He has ownea and operated a Color Computer for over three years and is presently taking an electronics and computer course by correspondence. Chris Bone is a college computer science major and has been programming for more than three years. He averages between six and nine hours a day on the CoCo.)





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The "Description:" line restates the function of the operation. In this case it tells you that a register (either A or B) is loaded with the contents of a memory location (indicated by P).

The last line, "Addressing Modes:" deserves a large portion of this month's column. Keeping the addressing modes straight is not difficult once you have had a chance to investigate how they work, so let's investigate the possible modes.

#### **Immediate Addressing**

In immediate addressing, the data for an instruction is the actual value of the instruction's operand. An example is:

#### LDA #32

The # symbol tells the assembler that the value of 32 decimal is to be loaded into register A. A hexadecimal value could be indicated by:

#### LDA #\$20

The \$ symbol tells the assembler that the value to be loaded is hexadecimal. As before, the # symbol causes a load of the actual value of Hex 20 or decimal 32.

#### **Extended Addressing**

It is just as easy to load the contents of a memory location into a register as it is to load an established value. Extended addressing can be used to cause the value of a memory location to be transferred to a register. This is done by leaving off the # symbol from the instruction, such as:

#### LDB 32

In this case, register B is loaded with the value that is contained in memory location 32. Again, you can follow the same procedure for Hex:

#### LDB \$20

If you glance through some of the other instructions in your assembler manual you will see that a great many instructions can operate in both the immediate and extended addressing modes.

#### **Indexed Addressing**

Registers X and Y are known as index registers, as noted last month. Although they are not used exclusively for indexed addressing, it is their main function. As 16-bit registers, they can manipulate values up to \$FFFF or 65536, which includes all of your computer's memory. In indexed addressing, you load registers X or Y with values that serve as pointers to a memory location. For example:

00100 START	LDX	#\$500	*Load X with a
00110	LDA	#\$20	memory value *Load Hex 20
			into A
00120	STA	,X	*Store the value
			of A into the
			memory loca-
			tion pointed to
			by register X

In this example, register X is used as a pointer to memory location \$500. You use a comma before the X to show that it is being used as an index to point to a location in memory. The power of indexed addressing lies in the ease with which the "pointer" in the X and Y registers can be adjusted, for example:

00100 START	LDX	#\$500	*Load X with A memory value				
00110	LDA	#\$20	*Load A with	1			

Hex 20

00120	LDB	#\$21	*Load B with
			Hex 21
00130	STA	,X+	*Store A in me-
			mory location
			\$500
00140	STB	,X	*Store B in me-
			mory location
			\$501

A plus symbol after the register X indicates that it is to be incremented after A is loaded into the memory address to which it is pointing. Thus the STB (store B) command stores the contents of register B into the next memory location, 500+1. An operation such as this could be put into a loop and any number of values could be loaded into sequential memory locations.

If you have not yet done so, it might be better to look at the ST instruction in your assembler manual. You will notice that its purpose is to transfer the value in a register to a memory location, as we have indicated above. The ST instruction can be either an 8- or 16-bit operation and it can operate in extended, direct or indexed addressing.

#### Inherent Addressing

With this addressing mode we will take a break from mental activity. It is the easiest of all addressing modes to understand because it does not require anything more than knowing what the instructions are and when to use it. Inherent addressing is exactly what its name implies, it provides all of its own information, nothing more needs to be added. For example:

#### RTS

is an instruction that causes program control to be returned to the parent routine from a subroutine. No address or values are needed nor, indeed, can

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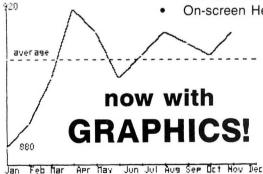
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be included. The return address for the instruction is automatically pulled from the S or hardware stack. There are a number of instructions that use inherent addressing. You might wish to glance through the instruction references and pick out some of the others, like CLR and SWI.

#### **Direct Page Addressing**

Direct page or direct addressing involves using the contents of the direct page register as the most significant byte of an address. In effect, your assembler does this anyway, but, on start up, the direct page register contains 0 and thus has no effect on other addresses. Once you put a value into the DP register, however, it is used as an offset for all 8-bit addressing.

In order to load the DP register, you must use the TFR (transfer) instruction, it cannot be loaded directly. For example:

LDB #\$44 \*Load the B register with the value of \$44

TFR B.DP \*Transfer the contents of B (44) to DP

will load a value of 44 into the direct page register. Now, if you issue an instruction:

#### LDB \$20

the assembler will use the value of \$44 as the most significant byte of the address whose contents were loaded into B. The effective address will be \$4420. As already mentioned, 8-bits can only hold a maximum value of 255. Thus a direct page address can be any of 256 bytes (0 through 255), beginning at the direct page register address.

Now, after saying all that, I will tell you that we probably won't be doing anything with direct page addressing in the near future, so if it seems confusing, don't worry. You could live quite a happy life without ever using this type of addressing.

#### Now For The Good Stuff

That's all there is to the various types of addressing. With that under your belt it is time to guit the chatter for this column and get on with the real thing.

Listing 1 at the end of the column was written by Chris to make use of some of the information we have passed on this month. Try and figure out what it does before reading the comments. If you can guess what is going on, you have been making great progress. Even if you only recognize some of what the program is for, you should be pleased with yourself. Take the time to study the program thoroughly, it isn't too long, but it contains several good routines that will be.

If all is not clear after studying the program, perhaps the followng will help: the crux of the program is that a green snake is created on a black screen with a green border. You can control the snake with a joystick plugged into the right joystick port. If the snake hits the screen border it is stopped and must change directions to continue. Chris has put lots of comments into the program to help you follow it through. Again, look it over carefully. Try and pick out routines you can load and assemble and try out on your own to see how they work and to see if you can change them to do something a little

## TCE News Release

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## In 1985 TCE Will Introduce CHILD'S PLAY

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Ted Malaska. President & Co-founder of TCE Programs Inc., announced today a new division for the development of business software.

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When asked why the name Child's Play was selected for a business series, Mr. Malaska responded: "Floating Overlays will make the program operation seem like Child's Play, compared to other business software of today."



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different; it is the way you will learn the quickest.

#### The Test

Now for the hard part. To see if you are really getting the hang of assembly language code, see if you can create a second snake to slither around with the first one, controlled with the left joystick. Use Chris' code to guide you in your efforts. Chris and I would be pleased to see the result of your efforts.

#### The Second Installment

If that isn't enough to keep you occupied during the next month, here is the second part of the 51-column text generator. This month we are including the portion of the code that will translate keystrokes into machine language generated characters. You will be able to use the new text screen after typing and and assembling the following source code. Before typing in this month's code, however, you will need to load last month's listing and renumber it according to Chris' instructions given with the listing. You will also need to type in and RUN the accompanying BASIC driver. The steps you should

follow are:

- 1) Type in this month's source code.
- 2) When finished, append last month's source code to the new code.
- 3) Delete the ORG line from the beginning of last month's code.
- 4) Renumber the combined codes. Check your assembler manual for how to do this.
- 5) Save the combined source codes.
- 6) Assemble the combined codes.
- 7) If there are any mistakes, correct them and assemble the code again.
- 8) Save the resulting machine language
- 9) Type in and save the BASIC listing (Listing 3).
- 10) When you are sure there are no mistakes in either the machine language code or the BASIC listing, load the machine language listing into memory. Then load the BASIC listing into memory.
- 11) Run the BASIC listing. You should be presented with a new, 51-column screen and the prompt, "Type what you want:"
- 12) Begin typing, as fast as you like.

13) Enjoy the new screen. It will soon be yours to use any time you like. It will also soon have several other programming features.

You may find it useful to compare this month's source code with last month's BASIC listing. As the two serve the same purpose, comparing them will help you understand what the source code listing is accomplishing and how it does the job.

The characters you see on your screen are now the text to be used in the finished program and will be 51 columns across the screen. Still to be installed are the hooks to disable the usual text mode and put you entirely into the new mode. As well, some of the other programming features that will accompany the new screen mode are not yet included.

Listing 2 is the source code for the new portion of the 51-column screen program. Listing 3 is the BASIC driver you will need to use the new 51character screen. Next month we will do away with all BASIC help and you will be in full 51 columns.

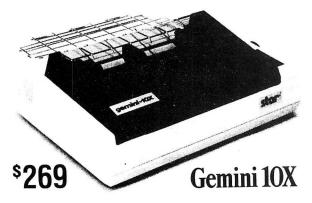


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			-	-				372 37 32-63		-	ALC: NAME OF STREET	
							667C 23	#2	66846	BLS	PAUSE	•IF SO GO PAUSE
								1F		DEC		OTHERWISE MOVE IT BACK
								5666		LDX		+SET DELAY LEN (1=SHORT FFFF=LONG)
								A7D3		JSR	\$A7D3	*CALL ROM DELAY ROUTINE
							8686 BD	A1C1	00880	JSR	\$AIC1	+CHECK KEYBOARD
								A2		BEQ	WAIT	+IF NO KEY KEEP GOING
							668B 39			RTS		*BACK TO BASIC
Listing	1.								88918 *******			•
Listing	5 1.								##92# +SET POI			•
									66936 +USE ROM			
									88948 +CALCULA	ATE MUST	OF THE	•
		66616	******	******	*******	•			66956 +STUFF			•
				LINE IS		•			88968 ******			
		88838	*ASSEMBI	LE THIS	PROGRAM	i n and the		86		PSHS	A,B	SAVE A, B FOR RETURN TO CALLER
		88848	+INTO M	EMORY WH	EREVER	•	668E 8E	##98		LDX		+GET READY TO TRICK ROM
		00050	₽EDTASM	+ PUTS I	T AND RUN	•	9991 34	10		PSHS	X	*SAVE SETRET AS RETURN ADDRESS
		88888	*IT FRO	M EDTASM	+ WITH	• 1000	0093 34	92		PSHS	A	+STACK X COORD
		88878	*GSTART	IN Z-BU	6	We are a second process.	9995 7E	A8D7		JMP		*GTO ROM ROUTINE
					TO SAVE		6698 A6	84		LDA	, X	*WE ARE BACK!!!! X=SCREEN LOC TO WORK ON
		88898	*RAM ON	16K SYS	TEMS. IF	r i i i i i i i i i i i i i i i i i i i	999A 9A	86		ORA	\$86	*SET BIT INDICATED BY ROM ROUTINE SAVE BACK ON SCREEN
		88188	+YOU AR	E USING	THE DISK	•	889C A7 889E 35	84 86	81848 81858	STA PULS	, X A, B, PC	*GET X AND Y COORDS BACK AND QUIT SET ROUTINE
				+ THEN U		<b>f</b>	BB1E 33	00	81868 ******			
					NT WAY AS				61676 •RESET I			
					E MANUAL				#188# +ALMOST			
					ES APPLY				81898 ******			
					MS IN THE	<b>.</b>	66A6 34	86	61186 RESET	PSHS	A,B	+SAVE A AND B
				STER BOT		•	99A2 8E	BBAC	81118	LDX		*RETURN ADDRESS
				TURE AND		•	88A5 34	18	01120	PSHS	X	+SAVE RETURN ADDRESS
					PROBLEMS	• *	98A7 34	62	81136	PSHS	Â	*SAVE X COORD
				AVE OCCU			88A9 7E	A8D7	61146	JMP	\$A8D7	*CALL ROM ROUTINE
		88288			CHRIS		#BAC BD	A885	#115# RSRET	JSR	\$ABB5	*CALL SECOND ROM ROUTINE TO RESET
9000 0					********		66AF 35	86	61168	PULS		*WASN'T THAT EASY!
	86	88228	START	LDB	4588	+CHR\$(128)=BLACK BLOCK	96B1	00	81178 SNAKE	RMB	20	TWHOM I (III) ENGI.
9982 BD	A92A	88238		JSR	\$A92A	*CALL BASIC'S CLS ROUTINE	9001	8888	61186	END	20	
					*******	•		0000	D1100	LIID		
			*DRAW B									
4445 45			******		*******	*SRART X COORD @ 0						
9985 4F		88278 88288	1.000	CLRA		+SET Y COORD @ 8						
8886 5F	##82	88298	LUUF	LBSR	SET	*SET (A,B)						
	1F	88388		LDB	#\$1F	+SET Y COORD @ 31						
	7E	88318		BSR	SET	*SET (A.B)						
BBBE 4C	16	88328		INCA	361	*X COORD = X COORD + 1						
	46	66336		CHPA	0540	+ALL THE WAY TO THE RIGHT?		•				
	F3	88348		BNE	LOOP	*IF NOT SET THE NEXT PAIR OF POINTS	Listing	2:				
9913 4F			LOOP1	CLRA		*SET X COORD @ 0						
	76	00360		BSR	SET	*SET (A,B)						
9916 B6	3F	66376		LDA	853F	◆SET X COORD € 63						
8818 BD	72	88388		BSR	SET	+SET (A,B)			00010			
881A 5A	201	88398		DECB	1700000	*Y COORD = Y COORD - 1			86826 +51 BY			
	F6	88488		BPL	LOOP1	*IF Y COORD >0 THEN SET MORE POINTS			66636 +TO BE			
	66B1	88418		LDX	SNAKE	*POINT TO BEGINNING OF TABLE OF VALUES			88858 ******			
6626 188E		88428		LDY	118	+10 POINTS IN THE SNAKE	7868	257	88868	ORG	17898	The contract of the contract o
8824 CC 8827 ED	2 <b>0</b> 10	88448		LDD	\$\$2018 .X++	*A=32 B=16 (CENTER OF SCREEN) *SAVE INTO TABLE	7888 4D		68678 START	TSTA		*NUMBER OR STRING IN USR?
	3F	66456		LEAY	-1.Y	•Y=Y-1	7661 27	13	66666	BEQ	TIUD	+IF NUMBER QUIT
662B 26	FA	88468		BNE	SCLR	*IF WE HAVEN'T INITIALIZED THE WHOLE TABLE LOOP	7983 E6	84	66696	LDB	, X	*B=LENGTH OF PASSED STRING
	66B1	88478		LDD	SNAKE	*GET FIRST POINT IS SNAKE (BACK END)	7665 16A	82	88188	LDY	2.1	*Y=START ADDRESS OF PASSED STRING
8838 BD		66488		BSP	RESET	*SET IT TO BLACK	7008 5C		66118	INCB		*LEN=LEN+1 (CUE QUIT ON NO LENGTH)
0032 BE		88498		LDX	SNAKE+	2 *GET START OF POINT LIST TO SET	7669 5A		00128 OLP	DECB		+LEN=LEN-1
9635 EC		68566	WLP	LDD	. 1	*GET FIRST POINT	700A 27	BA	66136	BE₽	TIUG	◆IF DONE QUIT
	1E	66516		STD	-2.X	*SAVE IT AS NEXT TO LAST ELEMENT	766C A6	A6	88148	LDA	, Y+	*GET FIRST CHR INTO A:Y POINTS TO NEXT CHR
8839 34	10	88528		PSAS	I	SAVE CURRENT POSITION IN SNAKE	788E 34	24	88158	PSHS	B, Y	*SAVE LENGTH AND LOC
8838 8D		00530		BSP	SET	*SET THE POINT	7616 BD		00160	BSR	60	*GO PRINT CHR*(A)
003D 35		88548		PULS	1	*GET BACK CURRENT SNAKE POS	7012 35		86178	PULS	B, Y	*GET BACK LENGTH AND LOC
883F 38		88558		LEAX	2, X	*POINT TO NEXT ELEMENT	7614 28	F 2	88188 44184 DULT	BRA	OLP	+OUTPUT NEXT CHR
8841 BC		00560		CMPX		26 *ALL DONE?	7016 39		88198 QUIT	RTS		*RETURN TO BASIC
8844 26 8846 EC	10	00576 00580		ENE	WLP -4.X	*IF NOT LOOP  *GET LAST ELEMENT SET			88218 *PRINT			•
	IE	88598		STD	-4, X	+SAVE AS NEW LAST ELEMENT			88228 *****			
884A 34		88688		PSHS	I .	+SAVE PLACE IN TABLE	7017 81	68	00230 60	CMPA	•8	*BACK SPACE?
##4C AD				JSR		*CALL ROM JOYSTICK ROUTINE	7019 26		86248	BNE	NOTBS	*IF NOT BRANCH
8858 EC		66626		LDD	,1	+GET JOYSTK(#) INTO A, JOYSTK(1) INTO B	701B 17		00250	LBSR	BACK	*MOVE CURSOR BACK 1
0052 35		88638		PULS	i	*RETREIVE TABLE POINTER	781E 86	28	88268	LDA	#32	*GET ASC FOR SPACE (BLANK OUT)
8854 81		88648		CMPA	●32	+STICK LEFT OR RIGHT?	7020 8D	3A	00270	BSR	LETTER	*PRINT SPACE
0056 22		88658		BHI	NOLEF	*IF RIGHT THEN GOTO NOLEF	7622 17	8609	86288	LBSR	BACK	*BACK IT UP AGAIN
9858 6A	1E	88568		DEC	-2.X	ex COORD = X COORD - 1	7025 39		66298	RTS		*ALL DONE BACKSPACE
885A 26	ØE	88678	Ĭ.	BNE	UPDN	*IF IT ISN'T ZERO THEN WE ARE STILL ON SCREEN	7826 81	90	88388 NOTBS	CMPA	112	+CLEAR SCREEN?
005C 6C	1E	88688		INC	-2,X	OTHERWISE MOVE IT BACK	7028 26	12	88318	BNE	NOTCL	*BRANCH IF NOT
885E 28		88698		BRA	UPDN	+GO CHECK UP/DOWN	7 <b>8</b> 2A 9E	BA	00320	LDX	\$BA	*START OF CURRENT HIRES PAGE
8868 60	1 E		NOLEF	INC	-2.X	+X COORD=X COORD + 1	702C BF	712A	00330	STX	POS	*SAVE AS CURRENT CURSOR LOCATION
8862 A6	1 E	88718		LDA	-2,X	*GET X COORD	782F 7F	7128	88348	CLR	BIT	*CLEAR BIT WITHIN BYTE FLAG
0064 81	3E	88726		CMPA	#\$3E	FALL THE WAY RIGHT?	7 <b>6</b> 32 CC	FFFF	00350 CLS	LDD		*D*SOLID WHITE
9966 23		88738		BLS	UPDN	*IF NOT GO CHECK UP/DOWN	7635 ED	81	86366 CTF00	STD	, X++	SAVE TO SCREEN
0068 6A 006A CI		88746		DEC	-2,I	*OTHERWISE MOVE IT BACK	7037 90	B7	88378	CMP X BNE	9B7	*AT END OF CURRENT HIRES SCREEN?
996A L1		88766	UPDN 3	BHI	●32 NOUP	*STICK UP OR DOWN?  *B>32 MEANS DOWN	7 <b>8</b> 39 26 7 <b>8</b> 38 39	FA	68388 68398	RTS	CLL00	*IF NOT GO AGAIN  *ALL DONE CLEAR SCREEN
886E 6A	1F	88778		DEC	-1.X	*Y COORD=Y COORD - 1	763C 8D	1E	88488 NOTCL		IFTTED	+SEND CHR\$(A) TO SCREEN
9878 26	9.0	88786		BNE	PAUSE	*IF STILL ON SCREEN THEN GO PAUSE			88418	LDX	POS	*GET CURRENT CURSOR POS
9072 6C	1F	88798		INC	-1.X	*MOVE BACK ON SCREEN	7041 9C	B7	88428	CMPX	9B7	+AT END OF HIRES SCREEN
8874 28		8888		BRA	PAUSE	*GO PAUSE	7843 25	16	88438	BLO	RET	•NO SCROLL NEEDED THEN
9976 6C			NOUP	INC	-1.X	*Y COORD= Y COORD + I	7845 38		88448	LEAX		*BACK UP POINTER ONE LINE
0078 E6		00829		LDB	-1.X	*GET Y COORD	7049 BF		86458	STX	POS	*SAVE AS NEW CURSOR LOC
887A C1		86836		CMPB	##1E	+STILL ON SCREEN?	784C 9E		88468	LDX	\$BA	*GET START OF CURRENT HIRES SCREEN
						100						

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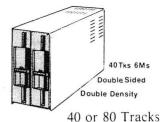
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784E	EC	89 8188	##47# SCLOOP	LDD	256.X	*GET BYTE FROM LINE BELOW WHEREVER WE ARE	7Ø9F 34	#2	88858	PSHS	A	*SAVE SLICE
852		81	88488	STD	, X++	*SAVE IN NEW LINE	78A1 CC		66866	LDD	#\$F8##	*READY TO BUILD 5 BIT MASK
954	7.00	712A	88498	CHPX	POS	*MOVED ALL LINES?	78A4 FD	7126	88878	STD	MASK	*SAVE AS CURRENT MASK
857		F5	00500	BNE		*IF NOT GO AGAIN	78A7 35		99889	PULS	A	*GET BACK SLICE
959		D7	00510	BRA	CLS	*CLEAR LAST LINE OF SCREEN (PARTIAL CLS)	70A9 C6	FF	99899	LDB	#\$FF	*SOLID WHITE
Ø58	39		88528 RET	RTS		*RETURN TO BASIC	78AB 7A	12.10.000	66966 BITTST	DEC	BIT+1	*BIT COUNT = BIT COUNT - 1
Ø5C		€D	88538 LETTER	CMPA	458D	*IS THE CHR A CARRIAGE RETURN	78AE 27	ØE	06918	BEQ	SAVE	*IF ALL DONE THEN THE MASK IS READY
7#5E		ØA.	88548	BNE	LETT2	*IF IT ISN'T JUST OUTPUT IT	7888 1A	81	66926	ORCC	#1	+SET CARRY FLAG
969	7F	712B	00550	CLR	POS+1	*SET BYTE WITHIN LINE TO ZERO(LHS)	7ØB2 46		88938	RORA		*MOVE SLICE
7863		712A	88568	INC	POS	*POINT CURSOR TO NEXT LINE	78B3 56		88948	RORB		# INTO 2 BYTES
1966		7128	99579	CLR	BIT	*SET BIT WITHIN BYTE TO LHS	7884 1C	FE	9995£	ANDCC	MSFE	*CLEAR CARRY FLAG
7869			66586	RTS	375 11	<b>*</b> RETURN	7886 76	7126	<b>88</b> 96 <b>8</b>	ROR	MASK	*MOVE MASK TO MATCH
786A		64	66596 LETT2	LDB	84	*4 BYTES / LETTER IN TABLE	7089 76	7127	66976	ROR	MASK+1	* IT IS 2 BYTES LONG
786C	-	712C	98698	STB	BYTE	+SAVE THE NUMBER 4 (NUMBER OF BYTES LEFT)	78BC 28	ED	<b>66</b> 98 <b>6</b>	BRA	BITTST	*80 SEE IF MORE MOVEMENT IS NEEDED
7Ø6F		20	88618	SUBA	4128	*A*A-32 (ANY CONTROL CODES HAVE BEEN DONE)	70BE 34	66	88998 SAVE	PSHS	D	*SAVE SLICE(NOW USES TWO BYTES)
7871			66626	MUL		*FIND ENTRY ON TABLE	7808 FC		81888	LDD	MASK	*GET WORKING MASK
7872		712D	66636	ADDD	*TABLE	*ADD TABLE OFFSET	70C3 AA	84	61616	ORA	, X	*WHITE OUT SCREEN SECTION
7075		<b>8</b> 2	66646	TFR	D, Y	*PUT PUT TABLE POINTER INTO Y	78C5 EA	<b>Ø</b> 1	81828	ORB	1, X	* (IT CAN SPAN TWO BYTES)
7877		712A	88658	LDX	POS	*GET CURRENT CURSOR LOC	70C7 A7	84	01030	STA	, X	*SAVE MASK BACK TO SCREEN
767A		A#	88668 LOOP	LDA	, Y+	*GET BYTE FROM TABLE	7809 E7	91	61848	STB	1, X	* (ONCE AGAIN IT IS TWO BYTES
797C		<b>#</b> 2	88678	PSHS	A	*SAVE THE BYTE	7ØCB 35	96	01050	PULS	D	*GET BACK WORKING MASK
787E		<b>BF</b>	##68#	ORA	458F	*MAKE LSN ALL ONES	70CD A4	84	01060	ANDA	, X	*SET REQUIRED BITS
7986		16	56696	BSR	SLICE	*PRINT THIS SLICE TO SCREEN	7ØCF E4	91	81878	ANDB	1, X	*IN BOTH BYTES
7682		#2	66766	PULS	A	*GET BYTE BACK	7801 ED	84	01000	STD	, X	+SAVE TO SCREEN
7084	48		66716	ASLA		*MOVE	70D3 30	88 20	61090	LEAX	32, X	*MOVE TO NEXT LINE
7885	48		88728	ASLA		+ LSN	70D6 39		61166	RTS	,	*ALL DONE THIS SLICE
7086	48		98738	ASLA		* INTO			81118 ******	*****	*******	**
7687			95748	ASLA		* MSN			81128 *MOVE	CURSOR F	ORNARD 5	•
7988	8A	<b>BF</b>	88758	ORA	#\$#F	*MAKE LSN ALL ONES			61136 *BITS	ONE CHA	RACTER)	•
788A		<b>€</b> C	88768	BSR	SLICE	*PRINT THIS SLICE			81148 *****	******	*******	**
798C	7A	712C	66778	DEC	BYTE	*NEXT BYTE TO BE DONE	70D7 F6	7128	81158 FORW	LDB	BIT	*GET CURRENT BIT WITHIN BYTE
788F	26	E9	##78#	BNE	LOOP	*IF MORE BYTES THEN LOOP	78DA CB	#5	81168	ADDB	#5	*PLUS 5 BITS
7891	38	89 FF##	66796	LEAX	-256, X	*POINT BACK TO TOP OF LETTER	70DC C1	87	81178	CMPB	17	*IF MORE THAN SEVEN THEN CHANGE BYTE
7895		48	99899	BSR	FORW	*MOVE CURSOR FORWARD ONE POSITION	70DE 23	84	81188	BLS	BITSV	*ELSE WE ARE DONE
7097		115	99819	RTS		*RETURN	78E8 38	#1	81198	LEAX	1.X	*ADD ONE TO SCREEN LOC
7898		7128	##82# SLICE	LDB	BIT	*GET CURRENT BIT WITHIN BYTE	78E2 C€	#8	81288	SUBB	#8	*RESET BIT COUNT
709B		, C.O.C.	ØØ83Ø	INCB		*ADD ONE TO IT	70E4 C1	87	81218 BITSV	CMPB	#7	*VERY RIGHT EDGE?
7890		7129	66846	STB	BIT+1	*SAVE AS TEMPORARY BIT COUNTER	78E6 26	ØF	61228	BNE		*IF NOT THEN NO NEW LINE

#### **Metric Industries**

#### For the color computer and TDP100

Model 101 Interface \$54.95

- · Serial to Parallel Interface
- Works with any Centronics Compatible Printer including Radio Shack, TDP, Gemini, Epson, Gorillia and many others
- Six switch selectable baud rates (300 to 9600)
- 90 day warranty
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#### Model 102 RS-232-C Switcher

- · Switches all three data lines
- Indicator lights let you know computer is on
- 3 position switch has silver plated contacts for high reliability
- Color coded lights indicate switch position
- Color coded labels for your printer, modem etc., supplied







- Prints five lines of information on pinfeed cassette labels
- Menu driven easy to use



- Uses special features of your printer for standard, expanded and condensed characters
- · 24 free labels included with program
- Auto centering features for each line of text
- 16K ECB required

#### **General Items**

- Gemini 10X Printer \$319.00
- Special Save Printer & Interface \$360.00
- C-10 Cassettes \$7.50/dozen
- Hard plastic boxes \$2.50/dozen
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Metric Industries
Department R
P.O. Box 42396
Cincinnati, OH 45242

**Dealer Inquiries Invited** 

70E8 1E	16	Ø123Ø	EXG	X,D	*PUT X WHERE WE CAN WORK ON IT	7120	FFFF #16## TABLE FDB \$FFFF +DATA TABLE FROM LAST MONTH
78EA C1	1F	81248	CMPB	#51F	*VERY RIGHT OF SCREEN		61618 **********************************
78EC 26	87	81258	BNE	BITDN	*IF NOT THEN SAVE CURRENT POS		#162# *DELETE THE ORG LINE *
78EE 4C		81268	INCA		*ELSE NEXT LINE		61636 *FROM LAST MONTH'S PART *
70EF 5F		81278	CLRB		*AND RESET BYTE WITHIN LINE		
78F8 1E	<b>8</b> 1	81288	EXG	D. X	+SMAP D AND X BACK		#164# *OF THIS PROGRAM AND RE-+
70F2 5F		81298	CLRB	-1"	*BIT WITHIN BYTE=Ø		61656 *NUMBER IT TO START AT *
78F3 28	<b>8</b> 2	01300	BRA	BITDNI	*GO SAVE NEW POS		01660 +1600, THEN TYPE IN THE +
70F5 1E	61	81318 BITDN	EXG	D, X	*SNAP D AND X BACK		61676 *LINES LISTED HERE UP TO*
7ØF7 F7	7128	#132# BITDNI		BIT	*SAVE BIT WITHIN BYTE		61686 *LINE 1596 *
70FA BF	712A	81338	STX	POS	*SAVE CURRENT CURSOR LOC		#169# *ASSEMBLE TO PROGRAM TO *
78FD 39		81348	RTS	, 00	*ALL DONE MOVING FORWARD		61766 +DISK OR TAPE +
		81358 *****	200				01710 *USE \$7000 IN LINE 60 *
		81368 *MOVE					#172# *FOR 32K MACHINES OR * #173# *\$38## FOR 16K MACHINES *
		01378 *****					01740 *USE THE NUMBER FROM *
78FE 34	84	81388 BACK	PSHS	В	*SAVE B FOR CALLER		61756 *LINE 66 IN LINE 26 OF *
7188 F6	7128	Ø139Ø	LDB	BIT	*GET CURRENT BIT WITHIN BYTE		#175# *THE BASIC PROBRAM AND *
71#3 BE	712A	01400	LDX	POS	*GET CURRENT CURSOR POS		81778 *THE NUMBER-1 IN LINE 18+
7186 C#	65	01410	SUBB	45	*BIT=BIT - 5		#178# +OF THE BASIC PROGRAM +
7188 2A	14	81428	BPL		*IF STILL OK THEN SAVE IT		61796 ************************************
718A CB	<b>68</b>	61436	ADDB	48	*ELSE FIX BIT COUNT		
718C 38	1F	61448	LEAX	-1,X	*AND BACK UP CURSOR POS	Listir	ng 3:
710E 1E	16	81458	EXG	X.D	*SWAP 'EM AGAIN		
711# C1	FF	81468	CMPB	#SFF	*NEED TO MOVE TO NEW LINE?	1.01	CLEAD1 SULEET OF EADTRA
7112 26	#8	81478	BNE	BACKS1	*IF NOT SAVE NEW POS		CLEAR1, &H6FFF: CLEAR300
7114 C6	1F	Ø148#	LDB	#\$1F	*END OF LINE	20	DEFUSRØ=&H7ØØØ
7116 1E	18	81498	EXG	X,D	*SWAP 'EM BACK	3Ø	PMODE4,1:SCREEN1,1
7118 C6	#2	81588	LDB	#2	*BIT WITHIN BYTE=2		
711A 28	€2	81518	BRA	BACKSP	*SAVE		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
711C 1E	10	#152# BACKS1	EXG	X,D	*SWAP 'EM YET AGAIN	nt	!"+CHR\$(13)
711E BF	712A	#153# BACKSP	STX	POS	*SAVE CURRENT POSITION	5Ø	GOSUB 9Ø
7121 F7	7128	61548	STB	BIT	*SAVE BIT WITHIN BYTE	7-1-	
7124 35	84	#155#	PULS	B, PC	*RETURN	60	
7126		#156# MASK	RMB	2	*MASK FOR STORING TO SCREEN	7Ø	GOSUB9Ø:GOTO6Ø
7128		#157# BIT	RMB	2	*BIT WITHIN BYTE	80	GOTO8Ø
712A	8E##	#158# POS	FDB	\$EØØ	*START OF SCREEN (\$688) FOR NON-DISK		
712C		#159# BYTE	RMB	1	*SLICES LEFT	90	A\$=USRØ(A\$):RETURN



# CoCo Community

e have compiled a list of Color Computer Clubs because of the many requests we have received. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs which have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs THE RAINBOW 9529 U.S. Highway 42 P.O. Box 385 Prospect, KY 40059

#### ALABAMA

- Birmingham Alabama Color Computer Club, Robert Matthews, 1725 14th Ave. S., Birmingham, 35205, (205) 933-0887
- Huntsville Color-80 Users Group, Randy Niemann, 1011 Versailles Dr., S.E., Huntsville, 35803, (205) 882-2485

#### ALASKA

Alaska Color Computer Users' Group, Rick McDannel, 430C Beluga Ave., Ft. Richardson, 99505, (907) 428-0392

#### ARIZONA

- Huachuca Hot Pokers, James Standley, 235-A Jeffords Street (NBU-96H), Ft. Huachuca, 85613, (602) 458-8338
- Tucson Color Computer Club, William H. Nunn, 6857 A Lighting Circle #22, Tucson, 85708

#### ARKANSAS

Central Arkansas CoCo Club, Melinda Braslovsky, 1203 Erving Rdg., LP Cabot, 72023, (501) 982-8854

#### **CALIFORNIA**

- Color America Users Group, Mark Randall, 2227 Canyon Rd., Arcadia, 91006, (213) 355-6111
- The Davis CoCoNuts, Adam Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195 Sacramento Color Computer Club, Wayne Chris-
- ope, P.O. Box 9, Elverta, 95626
- Joe Bennett, 1169 Florida Street, Imperial Beach, 92023, (474-6213)
- Los Angeles-Wilshire Color Computer Users' Group,c/o Norm Wolfe, 269 S. Lafayette Park Pl., Los Angeles, 90057
- Ventura County Color Computer Club (VC4), c/o Pete Lydall, Oxnard Public Library, 214 "C" Street, Oxnard, 93030, (805) 984-1842 or DATA (805) 984-1842
- South Bay Color Computer Club, Robert L. Cakebread, P.O. Box 3540, Redondo Beach, 90277, (213) 376-1169
- Sacramento CoCo Club, Charles Doughty, Box 60511, Sacramento, 95860
- Salinas Color Computer Club, Larry Livingston, 501 Monterey Highway, Salinas, 93908, (408) 484-9697
- Citrus Color Computer Club, Joseph Kohn, P.O. Box 6991, San Bernadino, 92412, (714) 792-8721
- Local Color—A CoCo Club of San Francisco, Andrew G. Kieval, P.O. Box 421242, San Francisco, 94142
- San Joaquin CoCo Club, Steven Paul Moreno, P.O. Box 99024, Stockton, 95209, (209) 951-3938
- Silicon Valley Color Computer Club, Shawn Jipp, P.O. Box 61593, Sunnyvale, 94088, (408) 749-1947
- CoCo Nutz Computer Club, Walter V. Seay, 68-461 Highway 86, Thermal, 92274, (619) 397-4252

#### COLORADO

- Lowry Microcomputer Club/CoCo Users' Group, Jerry D. Surritte, 2249 Moline St., Aurora, 80010, (303) 343-3273
- Colorado Color Computer Club, Joe Applegate, P.O. Box 33492, Northglenn, 80233, (303) 650-9768

#### FLORIDA

- Northwest Florida CoCo Nuts, William N. Lamb, P.O. Box 1032, Fort Walton Beach, 32549, (904) 244-5281
- Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282
- CoCo Chips Color Computer Club, 6 Belle Mead Circle, Largo, 33540, (813) 581-7779
- Broward County Color Computer Club, Timothy D. Neary, 510 S.W. 64th Ave., Margate, 33068, (305) 972-4074
- C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33582, (813)921-7510
- Broward CoCo Club, Sue Spahn, 11950 N.W. 29th Manor, Sunrise, 33582, (305) 741-4737

#### ILLINOIS

Glenside Color Computer Club, Chuck Roberg, 521 Canyon, Carol Stream, 60188, (312) 690-9374

- Town & Country CoCo, 5461 S. Kenwood, Chicago, (312) 493-3748
- Cook County Color Computer Club, Tim Powers, 1633 Fifth Ave., Chicago Heights, 60411, (312) 747-7062
- Illinois Color Computer Club of Elgin, Steven Stroud, 1098 Florimond Dr., Elgin, 60120, (312) 695-3186
- Northern Illinois Color Computer Club, 580 Milton Lane, Hoffman Estates, 60194, (312) 885-2573
- Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

#### INDIANA

- Three Rivers Users Group, Michael Milligan, 4923 Blum Drive, Fort Wayne, 46815, (219) 485-0278
- Indy Color Computer Club, Mike Davis, P.O. Box 68702, Indianapolis, 46268, (317) 257-3300
- Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446
- CoCo Program, Erik Merz, 310 Appletree Dr., Noblesville, 46060, (317) 842-1340

#### IOWA

- Metro Area Color Computer Club, K.L. Knudtzon, 3324 11th Ave., Council Bluffs, 51501
- Iowa City TRS-80 Users Group, Susan Chapler, R.R. 6, The Woods, Iowa City, 52240, (319) 351-5959

#### KANSAS

- Kansas City CoCo Club, Mike Allinder, P.O. Box 11192, Kansas City, 66111, (913) 287-1904
- Topeka Color Computer Club, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353
- Color Computer Club of Wichita, Rex Rivers, 1205 N. Mosley, Wichita, 67214, (316) 264-9193
- Walnut Valley C.C. Users Club, David Anderson, 1212 E. 4th St., Winfield, 67156, (316) 221-0040

#### KENTUCKY

LOCO-COCO, Mike Standefer, 3141 Doreen Way, Louisville, 40220, (502) 458-6690

#### LOUISIANA

- Red Stick Color Computer Club, Gary Cash, 8929 Metairie Drive, Baton Rouge, 70810, (504) 293-7799
- Cajun CoCo Club, Bob Hoevel, 104 Karen St., New Iberia, 70560, (318) 365-7706

#### **MASSACHUSETTS**

- Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803
- New England C.C. Users Group, Christopher E. Sweet, R.D. 2, Box 261, Harvard, 01451, (617) 456-8291
- Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenberg, 01462, (617) 582-6514
- 6809'ers, Paris Nepus, 93 Grochmal Ave., #90, Springfield, 01151, (413) 732-6633

#### MICHIGAN

- Petoskey Area CoCo Club (PAC<sup>3</sup>), Dennis Hoshield, 670 Liegl Drive, Alanson, 49706, (616) 347-0607
- Greg Miller, P.O. Box 365, Haslett
- Midland C.C. Club, Neil Drake, 709 Coolidge, Midland, 48640, (517) 631-2939
- Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

#### MISSISSIPPI

Singing River C.C. Club, Henry Nielsen, 9001 Gray Ave., Ocean Spring, 39564

#### MISSOURI

- North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078
- Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813
- Coconuts, 1610 N. Marlan, Springfield, 65803

#### MONTANA

Billings C.C. Club, Jayne Kenyon, 4306 Phillip, Billings, 59101

#### **NEW JERSEY**

Intrasoft, Ravi Sakaria, 139 Candace Lane, Chatham Twp., 07928, (201) 635-8025 Bug 80 Users' Group, George R. Miller, Jr., Box 62, Glen Gardner, 08826

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

#### **NEW MEXICO**

Chaves County Color Computer Club, Lee Mitchell, 1102 Melrose Drive, Roswell, 88201, (505) 623-0789

#### **NEW YORK**

Queensboro Color Computer Club, Bob Rosen, Springfield Blvd. & 56th Ave., Bayside, 11364, (212) 631-6233

Local CoCo, Charles Martin, P.O. Box 901, Bell-more, 11710

Broome CoCo Club, Bucky Helmer, 57 Front St., Binghampton, 13905

Adirondack CoCo Club (Home Office), Bill Edwards, Box 365, Bolton Landing, 12814, (518) 644-9927

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4214, Albany, 12204

Adirondack CoCo Club (Glens Falls Chapter), Dave and Richard Mitchell, 39 Center Street, Fort Edwards, 12828

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (212) 763-4233

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 11357, (315) 895-7730

#### NORTH CAROLINA

TRS-80 Users' Group of Charlotte, Jason Foodman, 240 Medearis Dr., Charlotte, 28211

Raleigh Color Computer Club, David Roper, P.O. Box 681, Garner, 27529

#### ОНЮ

CoCo Club of Youngstown, Timothy McFadden, P.O. Box 478, Canfield, 44406, (216) 788-4218

Columbus & Central Ohio Color Computer Club, D.E. Sparrow, 19 E.N. Broadway, Columbus, 43214, (614) 268-5366

Dayton CoCo Users' Group, Joseph P.Evans, 609 Applehill Dr., W. Carrollton, 45449

Cincinnati TRS-80 Users Group, R.A. White, 44 Dow Court, Fairfield, 45014

The Cleveland CoConuts, Paul Selig, 20734, Stanford Ave., Fairview Park, 44126, 333-2920

Dayton Are Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

M.U.G. of CoCo—Middletown Users Group, James Carr, Middletown, 45042, (513) 424-6905

Northeastern Ohio (N.E.O.) CoCo Club, Tony Rugue, 527 Malvern Drive., Painsville, 44077, (216) 354-2736

Miami Valley CoCo Club, R. Douglas Wales, 2065 LeFeure Rd., Troy, 45373

#### OREGON

Willamette Valley CoCo Users, Brian James, P.O. Box 11468, Eugene, 97440, (503) 687-9286

#### PENNSYLVANIA

HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789

Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001

Capital Area TRS-80 Users Group, David Morrow, 340 Lewisberry Rd., New Cumberland, 17070, BBS (717) 774-6543

Pittsburgh Color Group, William Tucker, P.O. Box 351, West Mifflin, 15122, (412) 466-3078

#### **RHODE ISLAND**

New England CoCo Nuts, P.O. Box 6604, Providence, 02940

#### SOUTH CAROLINA

Invitation Software Group, Tom Reed, 3562 Linbrook Dr., Columbia, 29204, (803) 786-0541

Midlands 80 Computer Club, Tommy Sanders, P.O. Box 7594, Columbia, 29202, BBS (803) 755-3414

Metropolitan Greenville CoCo Club, Ed Lowe, P.O. Box 6, Gray Court, 29645, (803) 876-3928

Hilton Head Island CoCo Club, Kevin Clark, P.O. Box 6187, Hilton Head Island, 29928, (803) 785-9630

Spartanburg County CoCo Club, Dennis Shattuck, 473 Royal Oak Drive, Spartanburg, 29302, (803) 583-3017

#### TENNESSEE

Chattanooga CoCo Club, Jim Perkins/Jim Cox, P.O. Box 9825, Chattanooga, 37412, (615) 870-2439

Memphis Color Computer Users Group, Billy Seaton, P.O. Box 11736, Memphis, 38111

#### **TEXAS**

CoCo User Group, David Karam, 1809 Dexter, Austin, 78704, (512) 442-6317

B/CS Color Computer Users Group, Dale Cuthbertson, 1812 Michael Lane, Bryan, 77801, (409) 822-0731

Deer Park Color Computer Club, Donald Burr, 4314 W. Grant, Deer Park, 77536, (713) 479-5313

International Color Computer Club, Inc., Robert L. Garrett, 2101 East Main Street, Henderson, 75652, (214) 657-7834

#### UTAH

Ogden CoCo, Kathy Rush, 4535 S. 2600 W. Roy, Ogden, 84067

#### VIRGINIA

D.C./N. VA. C.C. Club, Jack Darling, 43 Donovan Dr., Alexandria, 22306, (703) 780-6159

Northern Virginia C.C. Club, Logan McMinn, 6048 Belleview Dr., Apt. 1, Falls Church, 22041

Central Virginia Color Computer Club, Lane Lester, 413 Woodland Circle, Lynchburg, 24502, (804) 237-4188

#### WASHINGTON

Northwest Computer Club, Judy Gehman, E. 14012 Cataldo, Spokane, 99216, (509) 928-2169

#### **WEST VIRGINIA**

Kanawha Valley Personal Computer Club, P.O. Box 5354, Charleston, 25311, BBS (304) 925-3338 or 345-6502

Mtn. State CoCo Users Group, Donald G. Barber, Jr., P.O. Box 1084, Morgantown, 26507, (304) 599-4493

Mil-O-Bar C. C. Club, Jim Lemaster, Ona, 25545, (304) 743-4752

Blennerhassett CoCo Club, David Greathouse, Rt. 9, Box 119, Parkersburg, 26101

West Virginia Color Computer Club, William Mucklow, 949 Baier Street, St. Albans, 25177, (304) 727-6764

#### WISCONSIN

CoCo-MUG, Tom Fandre, P.O. Box 10152, Milwaukee, 53210, (414) 542-0600

Southern Wisconsin CoCo Club, David C. Buehn, P.O. Box 411, Twin Lakes, 53181

#### CANADA

#### ALBERTA

Calgary Color Computer Club, David Logan, 151 Whitelock Place N.E., Calgary, T1Y 4S7

Medley Computer and Electronics Club, P.O. Box 1267, Medley, T4A 2M0

#### **NEW BRUNSWICK**

Moncton Colour Computer Users Group, Richard Bissett, 43 Pine Glen Rd., Riverview, E1B 1V3

#### BRITISH COLUMBIA

North Island CoCo Club, Brian Marshall, P.O. Box 1740, Port Hardy, B.C., V0N 2P0

#### NEWFOUNDLAND

Avalon CoCo Club, A.R. Thompson, 10 Foran St., St. John's, A1E 4G1

#### **NOVA SCOTIA**

Halifax Dartmouth CoCo Users Group, P.O. Box 572, Dartmough, B2Y 3Y9, (902) 469-3656

#### ONTARIO

International Adventurer's Club, Maurice Dow, 84 Camberley Cres., Brampton, L6V 3L4

K-W C.C. Club, Peter Karwowski, 23 Hudson Crescent, Kitchener, N2B 2V7

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-7706

Meadowvale Color Computer Club, Howard Porter, P.O. Box 186, Streetsville, Mississauga, L5M 2B8

Niagara Regional CoCo Club, Harry VanDyke, 7707 Jubilee Drive, Niagra Falls, L2G 7J3

#### QUEBEC

Montreal TRS-80 Users Group, Jacobs P.C. Bagchus, 1176 Phillips Place, Suite 201, Montreal, H3B 3C8, (514) 861-3488 South Shore CoCo Club, Jacques Bedard, 33 Lisilre, St-Constant, P.Q., J0L 1X0

#### SASKATCHEWAN

Regina Color Computer Club, Georges Glass, 26 Tweedsmuir Bay, Regina, S4X 2B1, (306) 949-3942

Saskatoon Color Computer Club, Guy Tomashewski, 415-423 Pendygrasse Rd., Saskatoon, S7M 4Z2

#### **AUSTRALIA**

Blacktown City Colour Computer Users Group, Keith Gallagher, 27 Alford St., Blacktown, New South Wales, 2148

CoCo Colyteens of Colyton, Dwayne Manson, P.O. Box 506, St. Marys, New South Wales, 2760

#### MEXICO

Mexico City Color Computer Club, Marcelo Luft, Laja #232, 01900 Mexico D.F., Mexico City, 5-68-78-75

#### **WEST GERMANY**

First CoCo Club Hamburg, Theis Klauberg, 2000 Hamburg 62, Bultenmoor 43

# new clubs

#### Editor:

I am extremely pleased to announce the promotion of a new CoCo club. We are a non-profit organization with more features than I think you will find in any other CoCo club. Our club library can boast the ownership of over 300 CoCo programs and we are growing daily due to new member submissions as well as our weekly BBS hunt for new downloadable programs.

Anyone wishing to find out what owning a CoCo is all about can send a self-addressed stamped envelope to: Scarborough CoCo Club, 936 S. Wallace, 71822

Ashdown, AR

#### Editor:

It is with great plesure that I announce the birth of southeastern Arizona's TRS-80 Color Computer Users Group. At present, we claim 12 members. All members have upgraded memory to 64K and our systems range from cassette based to disk drive, and include both the original Color Computer and the newer CoCo II. We boast several talented programmers from our ranks and have plans to submit their work to future issues of THE RAINBOW.

We welcome correspondence from other already existing CoCo groups as well as interested inquiries from local CoCo owners. Write to: Huachuca Hot Pokers, 228B Jeffords St., 85613. Call (602) 458-0292 or 458-8338.

Tim Tulp Ft. Huachuca, AZ

#### Editor:

We are organizing a TRS-80 Users Group (including CoCos) in San Luis Obispo. We will meet the third Tuesday of each month in the Radio Shack Store at 209 Madonna Road. Call Wes Porter at (805) 481-2387, or write to: 2840 Halcyon Road, 93420 for further details.

Edward Bitter Arroyo Grande, CA Editor:

Is there any interest in forming a Bakersfield area CoCo Users Group? Meet others with common interests and exchange ideas on software, debugging, machine language, assembly language, hardware mods, programming, hints, group purchasing, amateur radio, problem solving, etc.

For information, call or write: 2521 Bishop, Apt. A, 93306, (805) 872-8618.

> Larry Sheridan Bakersfield, CA

Editor:

I would like to start a local Los Angeles Color Computer Club for us local central Los Angeles Color Computer buffs. All the present clubs are not in the city of Los Angeles. Call (213) 464-6809.

Franz Grey Hollywood, CA

Editor:

There is a users group in the New Haven area that has started up recently. Anyone interested in coming to the meeting, please call or write to: 544 Orange Center Road, 06477, (203) 799-2631.

> Patrick Palmer Orange, CT

Editor:

The CoCo Chips has been in existence for over a year. We have a large club library and meet once a month. The meetings are held at the Montessori School in Beleair on the first Friday of each month at 8 p.m. For further information, please contact Linda Signor at (813) 581-7779 or write to The CoCo Chips Color Computer Club, 6 Belle Meade Circle. Largo, FL 33540.

Robert Fallona Pinellas Park, FI

Editor:

We would like to inform you that there is a CoCo Users Group in Elgin.

We of the Illinois Color Computer Club have enjoyed your magazine articles and programs enormously. A number of us attended the RAINBOWfest and thought it was even better than the first.

At the present time we have about 22 members and meet the third Wednesday of the month at Aunt Mary's Restaurant just north of the I-90 expressway on Route 25 at 7:30 p.m.

We hope to grow in the knowledge and enjoyment of being a CoCo user as you have grown bigger and better youself. Keep up the fantastic work. Write to: 1117 Hunter Drive, 60120

> Ray Krack Elgin, IL

Editor:

Evansville area CoCo and MC-10 users are invited to help form the Evansville CoCo Users Group. If you are interested, call me at 424-0099, or Brad Callahan at 476-9453. Brad has a BBS on this number on weekends and you can leave us a message there.

> Dave Jenkins Evansville, IN

Editor:

The Toccoa Micro-computer Society is meeting on a new schedule. The meetings are every second Tuesday evening of each month at 7 p.m. at the Toccoa-Stephens County Public Library.

Thank you for this service. I realize that it costs THE RAINBOW a considerable amount to publish a Clubs section. It is very nice of you to do this for your readers. I guess that is just one of the many reasons that THE RAIN-BOW is miles ahead of the other CoCo magazines.

Steve Shields Eastonollee, GA

Editor:

The Oahu Color Computer Club meets at the Liliha Public Library in Honolulu the third Thursday of every month. All interested persons are invited to call or write: 47-164 C. Hui Akepa Place, 96744, or (808) 239-6534.

> Steve Galeski Kaneohe, HI

Editor:

I would like to inform your readers of the formation of the Lexington Color Computer Users Group. We meet the second Monday of each month. Anyone wishing more information should contact me at 224 Fairdale Drive, 40505 or call (606) 255-6007 after 6 p.m.

> Ed Jelf Lexington, KY

Editor:

I would like to know if anyone in the Ferriday-Jonesville area would be interested in starting a Color Computer Club. If so, please write me at Frogmore Pltn., 71335.

George Tanner Frogmore, LA

Editor:

I'd like to announce the founding of the Framingham Color Computer Club. We meet at Nat Walsh Music Studio on the second and fourth Thursdays of every month. There is also a BBS run on a CoCo by the club that may be reached at (617) 872-5170.

Mitch Cohen Framingham, MA

I would like to inform your readers that the New England Color Computer Users Group has a new address. Our new address is: N.E.C.C.U.G., R.D. 2, Box 261, 01451. We hold meetings about once every three to four weeks and we have a newsletter that comes out every month. If you would like information on the group, please contact us.

Chris Sweet Harvard, MA

I would like to form a Color Computer Lane, 48444.

> John Sormly Imlay City, MI

Editor:

We are currently forming a users group in the Jefferson City area and our numbers have risen to 12 interested individuals. For more information, write to: 900 Rock Hill Road, 65101.

> Wayne Johnson Jefferson City, MO

Editor:

I have had my CoCo for about three years and I am trying to start a CoCo club in the St. Louis area.

Anyone interested call or write (314) 327-6402, 856 Hancock Road, 63385.

Any age welcome!

Kel Kerr Wentzville, MO

Editor:

The CoCo Users Group - Monmonth/ Ocean County, meets on the second Friday of every month, 7:30 p.m. at 1401 Highway 71, 07719. For more information call (201) 280-2727 or 774-7426.

> John Stewart Belmar, NY

Editor:

We are proud to announce the birth of Intrasoft, an organization for Color Computerists. Members receive: a monthly newsletter, access to the Intrasoft library (software rentals through the mail), a list of members in their area, and vast amounts of information relating to the Color Computer.

For more information, call (201) 635-8025 after 3:30 p.m. on weekdays and ask for an Intrasoft representative. The first publication of our newsletter in Dec. 1, 1984. Library opens Dec. 1, 1984.

> Ravi Sakaria Chatham, NJ

Editor:

I live in Buffalo and am finding it quite difficult to find a Color Computer Club or a modem-equipped computer buddy nearby without paying a fortune in bills.

Does anyone in the Buffalo area know of any formed users group by mail or modem? There must be someone! I'd appreciate someone calling me at (716) 822-0175, or write to 33 Fields Ave., 14210.

Dan D'Alessandro Buffalo, NY

A few friends and I have been considering forming a Color Computer Club in Morehead City which would serve all of eastern North Carolina. The cost would be about \$4 a year and would cover such expenses as newsletters, a software library containing programs written by our members and possibly a bulletin board system containing such software. If there is anyone who might be interested in such a club, please write to me at P.O. Box 943, 28532 or call me at (919) 247-3037.

> Mike Fahy Havelock, NC

Editor:

As owners of Radio Shack's TRS-80 Color Computers, we are interested in contacting other Color Computer owners. We are lo-

Club in my area. I own a CoCo and I think it would be great to start a club. If you are interested, please contact me at 6321 Bosker cated in the Asheboro-Ramseur area. Contact either John Lutsie, Rt. 9, Box 312, 27203, phone 625-5477 anytime; or phone me at 824-2612 after 3 p.m.

> Helen Revnolds Ramseur, NC

Editor:

I'd like to start a CoCo users group in the Grove City-Columbus area. Anyone interested can call me at (614) 875-9786 or write me at 2480 Northbranch Road, 43123.

> Mike Gould, Jr. Grove City, OH

Editor:

We are happy to announce the existence of the CoCo Nuts Computer Club of Portland. We invite anyone in the Portland metropolitan area to attend our meetings. We meet the first Saturday of every month at the Far West Federal Building at 45th and Woodstock. We have a very large program library on both tape and disk available to all members. We would like to exchange newsletters with any interested CoCo Clubs as we are very proud of our newsletter and very interested in finding out what other clubs are doing. Please address all inquiries and newsletters to P.O. Box 6507, 97228. Phone (503) 252-5681.

> Rick Roth Portland, OR

Editor:

We are pleased to announce the formation of the Salt City CoCo Club of Utah in Salt Lake City for users of the Color Computer.

Our group is promoting interest in the Color Computer in the Salt Lake area. Some of the areas of interest in our club are hardware experimenting, machine language programming, educating others and showing off our Color Computers to the community.

We currently publish a monthly newsletter. Articles and programs from members

are included in each issue.

We meet on the even Thursdays of each month at 7 p.m. at Utah Transit Authority, 3600 S. 700 W. Anyone interested can call me at (801) 487-6032 or write to 720 E. Browning Avenue, 84105.

Dennis Mott Salt Lake City, UT

Editor:

The Color Computer: Montgomery County Users Group (CoCo: MUG) has been formed and meets monthly at the Christiansburg Library. Our members represent a wide range of CoCo users, from educational to business applications. One member even ran a BBS, (which we are trying to convince him to restart).

Any interested parties may contact me at

P.O. Box 774, 24073.

Ron Rogers Christiansburg, VA

Editor:

Please let it be known to your readers that I am trying to start a computer club for TRS-80s. Anyone interested can contact me by writing RT. 2, Box 76-C, 25801.

Greg Reed Beckley, WV

I would like to announce the forming of a TRS-80 club in the New London-Hortonville area. This is a group especially for those interested in getting games and other things children would like. We will not discuss word processing and business uses, but will see how many have printers and decide to discuss that or not. We would like children from the ages 11-14, but please call for exceptions. For information write RR 4, Box 156, 54961 or call (414) 982-2565.

I would also like to have contact from other CoCo Clubs around the country, or

just CoCo fans not in a club.

Paul Steinberg New London, WI

Editor:

Over the past two years a club in Milwaukee, called CoCo-MUG, has been in full swing. For information write: CoCo-MUG, P.O. Box 10152, 53210; or call Dan at (414) 258-9448 or Tom Fandre (414) 542-0600.

> Dan Neuman Wauwatosa, WI

Editor:

A new users group is being formed, the ESSA Color Computer Club in Simcoe County, Ontario. I urge all owners or potential owners of the CoCo in the Barrie, Angus-Borden and surrounding area to come out to the club meetings.

Activities include instruction in BASIC and Assembler programming, preparing of a newsletter, general and specific discussions and any other related activities. For further information call me at (705) 424-1354 or

write to P.O. Box 1001, L0M 1B0.

Eldon Doucet Angus, Ontario

Editor:

There are a lot of Canadians up here with CoCos, and we all think that your magazine is the best!

We'd like to hear from anyone in the Bruce County area who would like to form a CoCo club or just like to share information about our favorite computer. Anyone interested can write to P.O. Box 341, N0G 2V0.

John and Mimi Wong Walkerton, Ontario

Editor:

I am interested in joining or forming a Color Computer Club in Puerto Rico. If you have information about a club or would like to form one, please contact me at Paradis B-24, Caguas, P.R. 00625 or call (809) 743-2684.

Radames Aguayo Caguas, P.R.

Editor:

We are proud to announce the existence of the Dutch Color Computer Club. We have given it the name COCONUT. There are almost 200 members, some of them having a Dragon computer, which we also fully support. Our library now contains approximately 2,000 programs, most of them coming from the USA.

Send correspondence to: COCONUT, c/o Peter Senff, Waterrad 104, 1613 CR Groote-

broek, The Netherlands.

Peter Senff The Netherlands

Editor:

I would like to announce that I am activating a Philatelic Users Group for stamp collectors. I have worked it out so that the membership will more than pay for itself over the course of the year. For those that are interested, write to 21531 Meyers Road, 95320.

> John Root Escalon, CA

Editor:

I would like to inform the readers about the South Bay Color Computer Club. We meet the third Friday of every month at Mercury Savings in Torrance. For more information, call (213) 376-9755 or 538-8394

> Robert Cakebread Redondo Beach, CA

Editor:

Please inform your readers of the Dade Color Users Group of Miami. We are the largest and oldest Color Computer group in Dade County. Meetings are held at 7:30 p.m. on the third Tuesday of each month at the Miami Shores Community Center, 96th Street and Northeast 7th Avenue.

Further information may be obtained by leaving EMail on CompuServe to PPN # 70365, 463 or by calling the club BBS, 24 hours a day, (305) 751-6809.

Yearly dues are \$12/individual, and

\$18/family.

John Lovell Miami, FL

Editor:

The Atlanta Area Color Users Group has been in existence for three years and we now meet 10 months a year at Nash Middle School in Smyrna. Meetings begin at 7 p.m. and there are no dues at present. For more information, call Gary at 949-0369, Lee at 373-3216, or CBBS 378-4410.

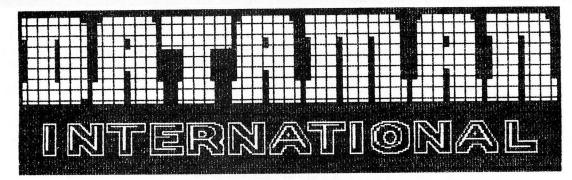
Gary McConville Douglasville, GA

Editor:

Our computer club name is Le Club d'Ordinateur Couleur de Quebec, Inc. (C.O. C.Q.).

The meetings will be every Wednesday at 7 p.m. at C.O.C.Q., Inc., Loisirs St-Mathieu, 7110, 8e Avenue, H2A 3C4.

Jean-Marie Beaujean Montreal, Quebec



RT LAST all the disk utilities you have been looking for have been collected into one easy to use, menu driven package. If you need to create auto start programs, back up your directories, verify disk sectors, recover lost files, view and modify disk contents or many other tasks, you will find our new DISKMASTER indespensible. The extensive instructions include a tutorial on disk structure. Includes 3 ring binder.

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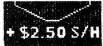
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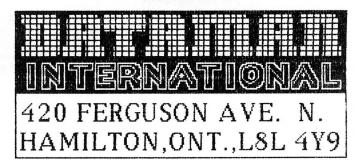
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# RAINBOWTECH

# **DOWNLOADS**

# Why Not Try a 128K Upgrade Kit or VDOS?

#### By Dan Downard Rainbow Technical Editor

• Is it possible, and if so, how big a project would it be to build a plug-compatible RAM disk for the Color Computer, i.e., a RAM disk that would plug into the second connector of the standard two drive cable (for all of us who just have one drive)? Could the standard Radio Shack controller handle a RAM disk of 256K or even 512K?

I have several software packages that will allow me to 'invert' the foreground/background on the amber monitor that I use with my Color Computer. The screen looks good with the black background and bright amber characters, but would look even better if the border was also black. Is there a way to make the entire screen (border and inner square) black and the characters amber? I have been told that since the software in question uses the Hi-Res screen (51 by 24) I'm stuck with things the way they are.

Dean C. Aukes Carrollton, TX

Dean, have you noticed the 128K upgrade kits recently advertised in the THE RAINBOW? One of these will solve your problem without resorting to an actual RAM disk. Some software authors are approaching these upgrade kits as quasi-RAM disks. Another solution is to buy VDOS by Dr. Preble's Programs. This program performs exactly

the function you are looking for.

As far as answering your question, we know of no practical way to use the disk controller for a RAM disk. The cable and connector are designed for a serial stream of data from a floppy disk. The data from a floppy is frequency modulated and it would seem far-out to try to emulate this signal. The several RAM disk packages for other computers we have seen replace the controller as well as the drive.

Now, for your problem with the back-ground color of your display. It is possible to have a black screen with amber characters. The software you have just doesn't offer that option. One quick solution is to purchase the *Word-Pak* accessory from PBJ. Not only will you get a black screen with amber characters, but 80 columns to boot.

I have noticed that there are several expansion devices (such as voice synthesizers and Radio Shack's X-pad) that either cost extra or are not available for the CoCo 2. Is this because the CoCo 2 does not supply 12 volts to the expansion port? If this is so, why not just connect a 12-volt power supply, such as Radio Shack #273-1652 to the correct pins on the connector inside the CoCo? I am not sure of which pins to connect this to, or even if this would work at all. There are probably many CoCo 2 owners that do not like spending the extra \$20 for a CoCo 2 compatible voice synthesizer or the \$180 for a Multi-Pak interface. With the 12 volts, one could just get a Ycable to connect two items to the expansion port instead of laying down big bucks for

the Multi-Pak.

Also, could two or more Y-cables be used to get several items connected to the CoCo, such as a disk drive, the X-pad and a voice synthesizer, to be used all at the same time? Mitch Cohen

Framingham, MA

It is very easy, and practical, to attach a 12-volt power supply to your CoCo 2, Mitch. An article on how to do this appeared in Tony DiStefano's column in the April, 1984 RAINBOW. If you already have a 12-volt power supply, connect the +12 lead to Pin 2 of the expansion connector. The ground connection should be made to Pin 33 or Pin 34.

If a regulated supply is not necessary for the device you have in mind, 12 volts is available on the positive side of C3, CR3 and CR4 in the CoCo 2. Some people have been known to run their older disk controllers requiring 12 volts by connecting this line to Pin 2 of the expansion connector.

I cannot directly answer the second part of your letter dealing with multi Y-cables without knowing what the specific devices and loading characteristics you are contemplating. Keep in mind that the expansion bus on the CoCo has unbuffered lines, e.g., direct lines to the microprocessor. Putting too much load on these lines could damage the 6809E. That's why we have the Multi-Pak interface.

• I have just discovered your very interesting magazine in my country, and am happy to read it every month.

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio [K4KWT]. His interest in computers began about five years ago and he has built several 68XX systems.)

I have a 32K Extended Color BASIC computer. Could you tell me how random numbers can be generated in machine language? Is there a subroutine in ROM that can be called?

J. Kostense Rotterdam, Netherlands

Nice hearing from the Netherlands, Mr. Kostense. There is a random number generating routine in the BASIC ROM. It is located at address \$BF1F. Floating point math is used and we hope to have a complete explanation of how the CoCo uses this system in an upcoming issue. The explanation is too involved for this column.

• I have two questions involving graphics. The first is about sprite graphics. Your reply to Theodore Arrington's letter implied that to have sprite graphics you need special hardware. I have used sprites on my friend's Commodore 64 and, from what I have seen, it seems like you could do the same thing with a software feature built into BASIC. How does a sprite video display generator chip work and how do you access it?

My second question concerns graphics Adventures. I understand how you would make one with a disk system. You would design your screens and save them as binary files. On a cassette system the screens would have to be resident in memory. You would need 6K for graphics memory, which leaves you almost enough memory for nine rooms; that leaves no room for the actual Adventure. You could use BASIC statements to draw the screens as you go along, but not only would this slow down the program, it would use up just as much memory if the screens were detailed. How can cassette-based graphics Adventures store so much data into so little memory?

> The Snyders Mansfield, CT

Sprite graphics are indeed hardware generated and not possible with the 6847 VDG inside our CoCos. You are correct in assuming that sprites can be simulated with software. In fact, this is what the Extended BASIC commands GET and PUT true to accomplish

try to accomplish.

The advantage of having hardware sprites is that less programming is required to move objects around the screen. Since the software overhead is minimal, quicker response is possible. You have to weigh this fact with the relative speed of the microprocessor though, and with our 6809E we've managed to ignore sprites so far and still have some outstanding games.

As far as saving graphics screens for games on tape, I would recommend a copy of *Bjork Blocks* distributed by Moreton Bay Software. As this program will more than adequately demonstrate, the data on graphics screens is usually highly repetitive, and can be condensed into smaller blocks.

• In reference to the November issue of your column, a letter from John Ruzicka of Florham Park, N.J., indicated he was experiencing many crashes, I/O Errors and directory crashes.

The problems he was experiencing were probably related to the "Tandy Gold" used on his edge connectors on the disk controller. The tin/lead contacts oxidize, causing intermittent contact problems. The alternate directory and backups are attacking the symptom, not the problem. Our Gold Plug 80, which has been on the market for several years solving the problem on the Model I computer, and for about a year and a half on the CoCo market, will eliminate the crashes and I/O Errors. The cost is minimal, and installation is fairly simple compared to trying to reconstruct one crashed directory. The Gold Plug 80 will solve the problem, not cure the symptom.

> Ed Pruitt Keller, TX

Thanks for the information, Ed. I agree with your evaluation and would recommend gold controller connectors. At the same time, it is only fair to mention that these plugs require soldering to your disk controller edge connector.

• I am interested in how the CoCo works. I like disassembling ROMs and using some techniques in my own assembly language programs. I am a beginner at assembly language, although I'm learning fast.

Because BASIC has to be "translated" into machine code, is there a way to intercept the machine code produced, and use it as an assembly language program? If so, would this method speed up the program?

Tim Richter Ulster Park, NY

Tim, I believe you may be confused by the difference between a compiler and an interpreter.

The CoCo ROMs contain an interpreter. Each line of BASIC is analyzed as it is encountered, and the commands are executed by calling the proper machine language subroutine in ROM. The only reason you can't read your program in memory exactly as you typed it is due to the memory (and time) conserving method of "tokenizing" each line. "Tokenizing" refers to the substitution of all commands with a single byte (sometimes two) equivalent.

Another method of generating BASIC programs is by using a compiler. A compiler actually translates the BASIC lines into machine language before the program is executed. This results in considerably faster execution, but normally requires more memory. There are several BASIC compilers on the market for the CoCo for you to experiment with, Tim.

• I am writing with two questions and a tip for those who wish to take advantage of it. The tip involves some cutting and soldering so some people will not want to make the modification. Those who do will also need to modify their joysticks or construct new ones.

It seems that when Radio Shack designed the Color Computer they decided to use a six-pin socket for the joystick ports, while the joysticks themselves use only a five-pin plug. This seems rather useless on first consideration; however, for those who have such programs as Graphicom that use the right joystick and fire button, and the left fire button, an idea springs to mind.

If you look at the way the sockets are mounted on the board, you can see that the center pin socket is connected to ground. This center mounting pin on each socket can be cut, which will allow the fire button on each port to be cross-wired to the opposite socket. Once this has been accomplished, six-pin plugs, six-conductor wire, and a soft-touch momentary switch can be picked up at other than Radio Shack (except for the switch) electronic stores, and the joysticks rewired with both fire buttons on each joystick.

Now for the questions. I have noticed several programs lately that allow for the adjustment of the step speed of disk drives. I would like to know how this is done and if it can be accomplished through BASIC commands. Possibly the Poke? Also, how is the SAM chip programmed to flip between one 32K memory bank and the other? I can flip to the all RAM mode, but am not sure about exchanging upper and lower 32K banks without physically changing the jumper inside the machine.

Thank you kindly for paying attention, and for being part of a fine publication.

Bob Goudie Kent, WA

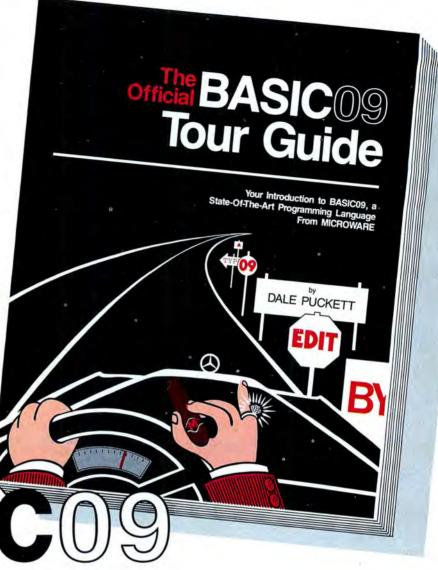
Thanks for the hint, Bob. Where there's a will, there's a way.

To check the speed of your disk drives without buying OS-9, look in your August 1984 RAINBOW for an excellent program called *Disk Drive Speed Check*, by Roger Schrag. This program times the cycle produced by the index hole in the disk and converts the period encountered to RPM. Your disk drives should run at 300 RPM.

The SAM chip is programmed to page between two 32K banks of RAM by the use of the MA7 address line going to the RAM chips along with the chip select circuitry. This memory management function is all but invisible to us, as all we have to do is program the proper register to page the memory.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

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# PERSONABLE PASCAL

# **Block Structure** And Recursion

#### By Daniel Adams Eastham **Rainbow Contributing Editor**

or the last couple of months we have been writing programs that contain procedures and functions. Using procedures and functions allows us to break up the overall program into smaller pieces and concentrate on solving a piece of the problem at a time. However, when we use procedures and functions there is much more than this simple dividing process that is going on.

#### **Block Structure**

The body of a program, procedure or function, is referred to as a block. This includes both the declaration and the execution statements. While in the past we have only shown procedures and functions contained within a program, these procedures and functions can themselves have internal procedures and functions. For example:

(Daniel Eastham holds a B.S. in computer science and has 13 years experience in systems and communications programming including work on the original Telenet packet switching network. He is the author of the DEFT Pascal Workbench and is currently president of Deft Systems, Inc.)

PROGRAM Main;

PROCEDURE First;

FUNCTION LocalRoutine: Real; **BEGIN** END;

BEGIN (\* PROCEDURE First \*) END:

PROCEDURE Second:

PROCEDURE LocalRoutine; **BEGIN** END;

FUNCTION SecondFunc: Real; BEGIN END;

BEGIN (\* PROCEDURE Second \*) END:

BEGIN (\* PROGRAM Main \*) END.

This program contains two procedures: First and Second. The procedure First contains a single function Local Routine. The procedure Second contains a procedure also named Local

Routine as well as a function named SecondFunc. You can see where the corresponding BEGINs are for each function by the indentation level and comments beside the BEGINs.

In this example, only the procedures First and Second are known within the main program. All procedures and functions contained within these two procedures are local to those individual procedures and are hidden from the main program.

This means that the function Local Routine in the procedure First is known only within the procedure First. The procedure LocalRoutine and the function SecondFunc in the procedure Second are both known only within the procedure Second.

The area (block) within which a particular symbol (label, constant, type, variable, procedure or function) is known is called its scope. There are basically three scoping rules that determine exactly where a symbol is known:

- 1) A symbol is known starting at the point at which it is declared.
- 2) It is known only in the block within

which it is declared.

3) It is known within *nested* blocks as long as there are no symbols declared within those *nested* blocks which have the same name.

Using the first rule we can see that the procedure *First* is known to the procedure *Second*. However, the procedure *Second* is *not* known to the procedure *First*. This is due to the fact that *First* is declared before *Second*.

The second rule is what allows us to use the symbol LocalRoutine twice: once in First and once in Second. The LocalRoutine in First becomes unknown once the end of the First procedure is reached. It is this second rule that we have been using all along to define local variables.

We will have to use a new example to explain the third rule:

PROGRAM Test;

VAR I, J: Integer;

PROCEDURE DoSomething;

VAR I: Real;

FUNCTION Compute (J: Real): Real;

BEGIN
I := J;
END;

BEGIN (\* DoSomething \*)
I := J;
END;

BEGIN (\* Test \*) I := J; END.

In this example, the symbols 'I' and 'J' are each declared more than once in the program. In the main program Test, 'I' and 'J' are each integers declared in the main program. In the procedure DoSomething, 'J' is still the same integer declared in the main program, but 'I' is now a local real number variable. In the function Compute, 'I' is still the real number variable delared in DoSomething, but 'J' is now the real parameter to the function.

You can see from this that each of the I := J assignment statements does something different. In the first one

(Compute), the local real parameter is assigned to the real variable declared in the enclosing procedure. In the second one (DoSomething), an integer declared within the program is converted to real and assigned to the local real variable. In the last one (Test), one integer is assigned to another integer.

These scoping rules are generally the same ones used in all *block structured* languages. Once you have learned them for PASCAL, you will also know them for PL/1, ALGOL, ADA and C.

#### Variable Allocation

In addition to only being known within the block in which it is declared, variables only exist when the block within which they are declared is active. Anytime a procedure or function is invoked that has some local variables or value parameters declared, memory is allocated for them at that time. When the procedure or function returns to the caller, the memory for the local variables is released. This form of memory allocation is known as automatic allocation since the memory for the variables is automatically allocated and released.

Automatic allocation results in two interesting properties of variables. First, the value that a variable has when its block is activated will not necessarily be the same value it had when that block was last activated. In fact, standard PASCAL requires that each variable be marked as undefined on entry to a block. This means that you cannot leave a value stored in a variable before exiting from a procedure and expect to use it the next time the procedure is entered.

#### Recursion

The second property results from the ability of a procedure or function to invoke itself. A procedure or function can do this by either invoking itself directly, or indirectly by invoking a second procedure, which eventually causes the first one to be invoked again. A procedure or function which does this is said to be *recursive*.

When a procedure or function is recursively activated, each activation of that procedure or function has its own set of local variables and value parameters. For example:

FUNCTION Factorial (Number:

Integer): Integer;

**BEGIN** 

IF Number < 0 THEN Factorial := 0 ELSE IF Number=0 THEN Factorial := 1

ELSE Factorial := Number \* Factorial (Number - 1); END;

Factorial is an integer function which returns the factorial of its parameter. In this case, Number is a value parameter which is allocated each time the function is activated.

For example, if the initial call is with the number 5, *Number* will be allocated and the value 5 will be stored in it. As you can see from the IF statement, this will cause *Factorial* to invoke itself with the value of 5-1 or 4. This causes *Number* to be allocated again with the value 4 being stored into it.

This process continues until there are six separate memory locations allocated for *Number* with the values 5, 4, 3, 2, 1 and 0. At this point the function does not invoke itself again, but rather returns the value 1. This, in turn, causes the multiplication of each of the other activations to complete until the final value (1\*1\*2\*3\*4\*5 = 120) is computed.

Note that reference parameters do not get allocated when a procedure or function is invoked. This is because they refer directly to a variable named by the caller. Only value parameters and local variables are automatically allocated.

#### **Example Program**

Although the above example demonstrates how recursion works, a recursive technique is not the best method for computing factorials. Instead, an *iterative* technique (using a FOR loop) would normally be used. However, when dealing with computer languages or artificial intelligence, recursive techniques can be very helpful.

This month we have a direct entry calculator program. This program lets the user directly enter a general arithmetic expression which is then evaluated using precedence rules (multiplication and division before addition and subtraction), and the use of parentheses. For example, it can correctly handle the following expressions:

It is also able to determine if an erroneous expression was entered, and indicate exactly where in the expression the error occurred. The technique used in the program is called *recursive descent*. To use this technique we first develop a grammar for the expressions

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that we are going to parse:

<expression> ::= <term>
 [ <addop> <term> ]
 <term>::= <factor>
 [ <mulop> <factor> ]
 <factor>::= <number> |
 (<expression> )
 <addop>::= + | <mulop>::= \* | /
 <number>::= legal PASCAL
 real number

In this case an expression is one or more terms separated with addition operators (either + or -). A term is one or more factors separated with multiplying operators (either \* or /). A factor is either a real number or an expression enclosed in parentheses. This last definition makes the grammar recursive.

That is, the grammar is defined in terms of itself.

The program is written with a function for each level of expression. An *Expression* function adds and subtracts terms, a *Term* function multiplies and divides factors, and a *Factor* function evaluates real numbers and handles expressions within parentheses.

The name recursive descent comes from the fact that we descend down the grammar until we reach a place that references one of the higher elements in the grammar. At this point we recursively invoke the higher level routine that handles this element. In this case, it is the Factor function that invokes the Expression function, causing Expression to be recursively activated.

In addition to using recursion, this

program also takes advantage of PASCAL's block structure by placing the Factor function inside the Term function, which itself is in the Expression function. This means that only Expression is known in the main program. This prevents a programmer from accidentally invoking the Term or Factor functions.

If you have any questions about block structure or recursion in PASCAL, you may call (301) 253-1300 during normal business hours for help. Next month we will go into detail about pointers and the heap in PASCAL.

If you have a disk system, these commands are needed prior to loading the program:

PCLEAR 1 FILES 0,0 CLEAR 16, 4999

```
The listing:
                                                                       10 0003
                                                                10 0003
       99 9999
                                                                           Local Routine within Expression to Parse a Term
                                                                10 0003
 99 9999
                                                                10 0003
 99 9999
           This program uses a recursive descent technique to
                                                                10 0003
                                                                       evaluate arithmetic expressions. After executing the
 88 8888
                                                                10 0003
           program, just enter an arithmetic expression and ENTER.
 99 9999
                                                                       FUNCTION Term (VAR Result : Real) : Boolean;
                                                                10 0003
           It will display the answer or the word ERROR and indicate
 88 8888
                                                                20 0006
 99 9999
           where the error is. To exit, just hit ENTER at the prompt.
                                                                20 0006
                                                                       VAR FactorAmount : Real;
 88 8888
                                                                                   : (OpMultiply, OpDivide);
                                                                20 0006
                                                                          Operator
 99 9999
        20 9996
 88 8888
                                                                        20 0006
 99 9999
        PROGRAM Calculator (Input, Output);
                                                                28 8886
 88 8888
                                                                29 8886
                                                                          Local Routine within Term to Parse a Factor
 99 9999
        VAR CharCount : Integer;
                                                                20 9996
 88 8888
           Value
                 : Real;
                                                                        20 0006
           ThisChar : Char:
 99 9999
                                                                20 0006
 88 9999
                                                                29 8886
                                                                       FUNCTION Factor (VAR Result : Real) : Boolean;
 99 9999
        38 8889
 69 6666
                                                                30 8889
                                                                        VAR MinusFlag : Boolean;
 99 9999
           Routine to Parse an Expression
                                                                30 0009
                                                                          Number
                                                                                   : String;
 99 9999
 99 9999
        30 0009
                                                                        BEGIN
                                                                31 0010
 88 8888
                                                                         Factor := False:
 99 9999
        FUNCTION Expression (VAR Result : Real) : Boolean;
                                                                31 8814
                                                                         MinusFlag := False;
 19 9993
                                                                31 0018
 19 9993
        VAR TermAmount : Real;
                                                                31 0018
                                                                         REPEAT
 10 0003
           Operator : (OpAdd, OpSubtract);
                                                                31 9918
                                                                           READ (ThisChar);
 10 8993
                                                                31 0032
                                                                          CharCount := CharCount + 1;
```

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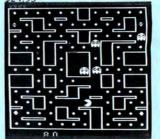


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```
31 8843
           UNTIL ThisChar () ' ':
31 8858
31 6050
           IF (ThisChar = '-') OR (ThisChar = '+') THEN BEGIN
             MinusFlag := ThisChar = '-';
32 997F
32 4491
             REPEAT
32 8891
               READ (ThisChar);
32 66AB
               CharCount := CharCount + 1;
32 99RC
             UNTIL ThisChar () ' ';
32 0009
31 9909
           CASE ThisChar OF
31 8809
31 88D1
             '0', '1', '2', '3', '4', '5', '6', '7', '8', '9',
31 #122
             '.' : BEGIN
                     Number := '':
32 912A
32 Ø137
                     REPEAT
32 9137
                       Number := Number + ThisChar;
32 8154
                       READ (ThisChar);
32 Ø16E
                       CharCount := CharCount + 1;
                     UNTIL NOT (ThisChar IN ['0'...'9', '.', 'E']);
32 #17F
32 Ø182
                     Result := ENCODEREAL (Number);
32 0100
                     FND:
             '(' : REGIN
31 0103
32 #1DB
                    IF NOT Expression (Result) THEN EXIT;
32 0202
                     IF ThisChar () ')' THEN EXIT;
32 #21R
                     READ (ThisChar):
32 9235
                     CharCount := CharCount + 1;
32 8246
                     END
31 4246
             ELSE EXIT
31 #240
             END:
31 Ø24D
           IF MinusFlag THEN Result := -Result;
31 #240
31 0267
           WHILE ThisChar = ' ' DO BEGIN
31 0267
32 0270
             READ (ThisChar);
32 9299
             CharCount := CharCount + 1:
32 Ø2A1
             END:
31 #2A3
31 0243
           Factor := True:
31 Ø2A8
         END:
       BASIC COMPILER
              MLBASIC 1.0 - BASIC COMPILER
```

WASATCHWARE is pleased to introduce what we feel is the most comprehensive BASIC Compiler available for the Color Computer. This BASIC compiler, called MLBASIC, is for programmers who want to create machine language from BASIC programs. Written in machine language, MLBASIC will prove to be the most powerful utility on your shelf.

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	CLOSE	CLOADM	CSAVEN	DIR	DRIVE	DSK1\$		
	DSKOS	FIELD	FILES	GET	INPUT	KILL		
	LSET	OPEN	PRINT	PUT	RSET			
2.	Program C	ontrol C	ommands					
	CALL	END	EXEC	FOR	STEP	NEXT		
	GOSUB	GOTO	IF	THEN	ELSE	ERROR		
	ONGO	RETURN	STOP	SUBROUT	INE			
3. Wath Functions								
	ABS	ASC	ATN	cos	CNV	EOF		
	EXP	FIX	INSTR	INT	LEN	LOG		
	LOC	LOF	PEEK	POINT	PPOINT	RND		
	SGN	SIN	SQR	TAN	TIMER	VAL		
4.	String Fu	nctions						
	CHR\$	INKEYS	LEFTS	MIDS	MKNS	RIGHT\$		
	STR\$	STRING\$						
5.	Graphic/S	ound Com	mands					
	COLOR	CLS	CIRCLE	DRA~	LINE	PAINT		
	PCLEAR	PCLS	PLAY	PMODE	PRESET	PSET		
	RESET	SCREEN	SET	SOUND				
6.	Other/Spe	cial Com	mands					
	DATA	DIM	LLIST	MOTOR	POKE	READ		
	REM	RESTORE	RUN	TAB	VERIFY	DLD		
	DST	IBSHFT	LREG	PCOPY	PMODD	PTV		
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```
20 02AC
        20 02AC
20 0240
           Main Entry for Term Routine
20 02AC
20 02AC
        20 0240
20 02AC
21 Ø282
          Term := False:
21 #286
          IF NOT Factor (Result) THEN EXIT:
21 0207
          WHILE ThisChar () CHR (13) DO BEGIN
21 0207
22 Ø2EB
           CASE ThisChar OF
22 #2FD
             '*' : Operator := OpMultiply;
             '/' : Operator := OpDivide
22 Ø2FD
22 0305
             ELSE BEGIN
23 0300
                    Term := True;
23 Ø312
                    EXIT:
23 @316
                    END
22 Ø316
             END:
22 Ø316
22 Ø316
           IF NOT Factor (FactorAmount) THEN EXIT;
22 @336
22 #336
           CASE Operator OF
22 9338
             OpMultiply : Result := Result * FactorAmount;
22 Ø35E
             OpDivide : Result := Result / FactorAmount
22 Ø373
             END:
22 Ø38Ø
            END;
21 Ø383
21 0383
          Term := True;
21 9388
        END:
 10 038C
         10 0380
 10 0380
            Main Entry for Expression Routine
 10 0380
 10 0380
         10 0380
 10 038C
        REGIN
 11 0392
          Expression := False;
 11 0396
           IF NOT Term (Result) THEN EXIT;
 11 0397
           WHILE ThisChar () CHR (13) DO BEGIN
 12 #309
            CASE ThisChar OF
 12 Ø3CB
              '+' : Operator := OpAdd;
              '-' : Operator := OpSubtract
 12 #3DB
 12 Ø3E3
              ELSE BEGIN
 13 Ø3EB
                    Expression := True;
 13 93F9
                    EXIT:
 13 Ø3F4
                    END
 12 #3F4
             END;
 12 Ø3F4
 12 Ø3F4
            IF NOT Term (TermAmount) THEN EXIT;
 12 9414
            CASE Operator OF
 12 8416
             OpAdd : Result := Result + TermAmount;
 12 9430
              OpSubtract : Result := Result - TermAmount
 12 Ø451
              END;
 12 Ø45E
            END:
 11 8461
 11 8461
          Expression := True;
 11 8466
 99 946A
         00 046A
 00 046A
         * Main Entry for Calculator Program
 89 946A
 00 046A
         88 846A
 00 046A
 91 8479
 Ø1 Ø47C
           WRITELN;
 01 0484
           WRITELN ('CALCULATOR PROGRAM');
 Ø1 Ø4A8
 91 9449
           REPEAT
 81 84A8
            WRITE (') ');
 Ø1 Ø4BB
            CharCount := 0;
 01 04RF
            IF Expression (Value) AND (ThisChar = CHR (13)) THEN
 01 04EC
              WRITELN ('=', Value:14:4)
 01 0512
            ELSE IF (CharCount > 1) OR (ThisChar (> CHR (13)) THEN BEGIN
              WRITELN (' ': CharCount, ' ^ ERROR');
 02 0546
 92 95AC
              IF ThisChar () CHR (13) THEN READLN;
 02 0584
              END:
          UNTIL (CharCount = 1) AND (ThisChar = CHR (13));
 01 0584
 01 0582
```

# RAINBOWTECH

# hogg\_wash

# More 128K

#### By Frank Hogg Rainbow Contributing Editor

ast month, I promised I would have a program to use the 128K with FLEX. I am happy to report I have done just that. There is always a chance something will interfere with my plans, and I am glad it didn't, so on to the program.

When I first thought of doing this, I planned to use a command that worked like so: BANK alone would give you the current bank we are in. BANK 1 would switch to bank 1, BANK 1, 100 would switch to bank 1 and jump to address Hex 100. This turned out to be clumsy. First off, you never know what bank you are in unless you type BANK, and this is a pain. Second, the length of the command line is too long for heavy use. Here's an alternative. There are three commands, 'a', 'b' and 'c', all in the one program below. All of them do the same thing — they switch to either bank 0, 1 or 2. I used letters instead of numbers because they look better as the first character of the prompt. When you switch to bank 'b', for instance, the first letter of the '+++' prompt becomes a 'b', like so: 'b++'. This way, you always know what bank you

are currently in. If you put a Hex number after the command, you will jump to that address. This works just like the FLEX JUMP command.

The entire program fits inside an area of memory that is empty in CC FLEX 5.0:4. The area at \$FE00 to \$FEFF is not used and is therefore usable for this purpose.

When first issued, BANK adds itself to FLEX's user command table and a small program initializes everything. You will see the prompt change from '+++' to 'a++' to show that we are in bank 'a'. Try typing 'b' or 'c'. Instantly the prompt changes and so does the bank.

I am presuming you have an installed and tested 128K board in your system. This program does not check for that; it just assumes it and will look the same on a system with only 64K. Let's try it out.

a++B b++GET 0.ED.CMD b++C c++GET 0.ASM.CMD c++A

We now have ED in bank 'b' (1) and ASM in bank 'c' (2). This allows us to edit a program using bank 'b', assemble it using bank 'c', and then test it using bank 'a'! All without accessing the disk,

except to read the file we are working with. Here's how it looks in practice.

a++B 0 test b++C 3 test c++A a++test

'B 0 test's witched to bank 'b', jumped to Hex 0 where the cold start address of ED is and edited the file test. 'C 3 test's witched to bank 'c', jumped to Hex 3 where the cold start address of ASM is and assembled the program test. Then we switched to bank 'a' and ran the program to try it out. This speeds up program development like you wouldn't believe!

The pitfalls: It is important to have a program in memory before jumping to it. I speak from experience. The results can be amusing if you try it without a program in memory. One time I did this; the printer started to issue formfeeds one after another while the screen went bananas. The lesson is to make sure to have a program in the bank before you jump into it. In other words, don't jump off the cliff without someone to catch you.

#### **Advanced Uses**

How would you like to have several programs running in separate banks and switching from one to the other? Well, I took the challenge by trying to

(Frank Hogg is the president of Frank Hogg Laboratory; one of the world's largest suppliers of software for 6809 based computers. He and his wife, Linda, live in Syracuse, New York.)

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have two XBASIC programs that called each other. I had to add some things to the program to save the current stack. I think you could expand on what I have done, but this does work.

First, the problems; FLEX has 48K of user memory and these banks are only 32K. That means the upper 16K of the user memory cannot be switched. only the lower 32K. Many programs use whatever user memory is available, so this could be a problem. The answer is that these same programs use FLEX's memory end pointer (MEMEND) to restrict themselves to the area available. All we have to do is set MEMEND to \$7FFF, which indicates to these programs that only the lower 32K is available to them. Use the MEMEND command to set MEMEND to \$7FFF, and we are all set.

a++MEMEND 7FFF 7FFF a++B b++XBASIC READY 10 PRINT "I AM IN BANK B" 20 EXEC, "C:XBASIC" 30 PRINT "I AM BACK IN BANK B" RUN I AM IN BANK B READY 10 PRINT "I AM IN BANK C" 20 EXEC, "B" 30 PRINT "I AM BACK IN BANK C" 40 GOTO 20 RUN I AM BACK IN BANK B READY 20 EXEC, "C" 40 GOTO 20 LIST 10 PRINT "I AM IN BANK B" 20 EXEC, "C" 30 PRINT "I AM BACK IN BANK B" 40 GOTO 20 RUN I AM IN BANK B

I AM BACK IN BANK C
I AM BACK IN BANK B
I AM BACK IN BANK C
I AM BACK IN BANK B
I AM BACK IN BANK C
I AM BACK IN BANK B

Stop the thing by holding down the BREAK key and hitting ENTER. You could probably think of something more useful than this, but you get the idea. It would be possible to use all three banks this way, and you could even switch MEMEND up and down in one of the banks. The possibilities are interesting. At worst, you have several new ways to crash your system and, at best, you can make a powerful computer even more useful than before.

```
32
                                                                                                    FE17 FE63
                                                                                                                                  fdb
                                                                                                                                          , p,
                                                                                                    FF19 50
                                                                                               33
                                                                                                                                  fer
                                                                                                                                                    Existing P command
                                                                                               34
                                                                                                    FEIA 86
                                                                                                                                          0
                                                                                                                                  fcb
                                                                                               35
                                                                                                    FE1B E3B8
                                                                                                                                  fdb
                                                                                                                                          $e3b8
                                                                                               36
                                                                                                    FE1D 00
                                                                                                                                  fcb
                                                                                                                                          a
                                                                                                                                                    Ends table
                                                                                               37
                                                                                               38
                                                                                                                          * Bank Ø (a command)
                                                                                               39
                                                                                               46
                                                                                                    FE1E 34
                                                                                                                                  oshs
                                                                                                                                          X
                                                                                                                                                    duagy
                                                                                               41
                                                                                                    FE20 34
                                                                                                              7F
                                                                                                                                  pshs
                                                                                                                                          u, y, x, dp, b, a, cc save it all
  Listing 1:
                                                                                               42
                                                                                                    FE22 8D
                                                                                                              75
                                                                                                                   FE99
                                                                                                                                  bsr
                                                                                                                                          abc
                                                                                               43
                                                                                                    FE24 10AE 84
                                                                                                                                  ldv
                                                                                                                                          8.x
                                                                                                                                                     get bank 0's return address
                                                                                                                                          ESCREG
                                                                                                    FE27 10BF CC16
                                                                                               44
                                                                                                                                   sty
                                                                                                                                                    restore it
                  nam BANK.CMD
                                                                                               45
                                                                                                    FE2B BE FE07
                                                                                                                                          #ststab
                                                                                                                                                    point to stack table
                           * Bank switch and jump command for DSL 128K on CoCo
                                                                                                    FE2E 10EE 84
                                                                                               46
                                                                                                                                  1ds
                                                                                                                                          8. x
                                                                                                                                                    reset stack pointer
 2
                                                                                               47
                                                                                                    FE31 7F
                                                                                                              FEDD
                                                                                                                                   clr
                                                                                                                                          bank
                                                                                                                                                     set bank to a
 3
                  CD42
                           BETHEX
                                  egu
                                           $cd42
                                                                                               48
                                                                                                                          # Switch to 0
                   CD#3
                           WARHS
                                           $cd93
                                                                                               49
                                                                                                    FE34 7F
                                                                                                               FFAE
                                                                                                                                          latche
                                   equ
                                                                                                                                  clr
 5
                  CC12
                           UTABLE
                                   equ
                                           $cc12
                                                                                               50
                                                                                                    FE37 86
                                                                                                               61
                                                                                                                                  lda
                                                                                                                                          #'a
                                                                                                                                                     set prompt
                   CC16
                           ESCRES
                                           $cc16
                                                                                                    FE39 B7
                                                                                                               CC4E
                                                                                                                                          olus
                                   equ
                                                                                                                                   sta
                                                     First '+' in '+++'
                  CC4E
                                                                                               52
                                                                                                    FE3C 20
                                                                                                                   FE86
                           olus
                                   eau
                                           $cc4e
                                                                                                               48
                                                                                                                                  bra
                                                                                                                                          jump
                                                                                                                                                     00
 8
                   FEBB
                           open
                                   equ
                                           $fe00
                                                                                               53
                           latchc equ
                                           $ffac
                                                                                               54
                                                                                                                          # Bank 1 (b command)
10
                   FFAD
                                                                                               55
                           latchd equ
                                           $ffad
11
                  FFAF
                           latche
                                   equ
                                           $ffae
                                                                                               56
                                                                                                    FE3E 34
                                                                                                              10
                                                                                                                                   pshs
                                                                                                                                                     dummy
12
                           latchf equ
                                           $ffaf
                                                                                               57
                                                                                                    FF40 34
                                                                                                                                   pshs
                                                                                                                                          u,y,x,dp,b,a,cc
13
                                                                                                                    FE99
                                                                                               58
                                                                                                    FE42 8D
                                                                                                               55
                                                                                                                                   bsr
                                                                                                                                          abc
14
    FEBB
                                   orq
                                           $fe88
                                                                                               59
                                                                                                    FE44 10AE 02
                                                                                                                                   ldy
                                                                                                                                          2,x
15
     FE88 88
                                   fcb
                                                      Current bank we are in
                                                                                                    FE47 10BF CC16
                                                                                               60
                                                                                                                                          escrr
                                                                                                                                   stv
16
     FE01 8000
                           esctab
                                   fdb
                                           Ø
                                                     Bank Ø ESC return address
                                                                                               61
                                                                                                    FE4B BE
                                                                                                              FEØ7
                                                                                                                                   1 dx
                                                                                                                                          #ststab
                                                                                                                                                    point to stack table
17
     FF63 8888
                                   fdh
                                           a
                                                     Bank 1 etc
                                                                                               62
                                                                                                    FE4E 10EE 02
                                                                                                                                  1ds
                                                                                                                                          2, x
                                                                                                                                                     reset stack pointer
18
     FE05 0000
                                   fdb
                                                     Bank 2 etc
                                                                                               63
                                                                                                    FE51 86
                                                                                                                                   1 da
                                                                                                              91
19
                           * Stack pointer holding area
                                                                                               64
                                                                                                    FE53 B7
                                                                                                              FERR
                                                                                                                                          bank
                                                                                                                                                     set to bank b
                                                                                                                                  sta
     FF87 8888
28
                           ststab fdb
                                                     a
                                                                                               65
                                                                                                                          * switch to 1
21
     FE89 8888
                                    fdb
                                                                                                    FF56 7F
                                                                                                                                  clr
                                                                                                                                          latcho
                                                                                               66
22
     FEØB ØØØØ
                                   fdb
                                                     2
                                                                                                    FF59 7F
                                                                                                              FFAF
                                                                                                                                          latchf
                                                                                               67
                                                                                                                                  clr
23
                           * User command table extension
                                                                                               68
                                                                                                    FE5C 86
                                                                                                               62
                                                                                                                                  lda
                                                                                                                                          #'b
24
     FEØD 41
                                   fcc
                                           'A'
                                                     a
                                                                                               69
                                                                                                               CC4E
                                                                                                                                          plus
                                                                                                                                  sta
25
     FEBE 88
                                    fcb
                                           0
                                                                                               78
                                                                                                    FE61 20
                                                                                                                   FE86
                                                                                                                                          jump
                                                                                                              23
                                                                                                                                  bra
26
     FEØF FEIE
                                   fdb
                                                                                               71
27
     FE11 42
                                   fcc
                                           ' R'
                                                     1
                                                                                               72
                                                                                                                          * bank 2 (c command)
28
     FE12 00
                                   fcb
                                                                                               73
29
     FE13 FE3E
                                   fdb
                                                                                                    FE63 34
                                                                                               74
                                                                                                              18
                                                                                                                                  pshs.
                                                                                                                                                    dusav
3#
     FE15 43
                                   fcc
                                           'C'
                                                     2
                                                                                               75
                                                                                                    FE65 34
                                                                                                                                  oshs
                                                                                                                                        u,y,x,dp,b,a,cc
31
     FE16 88
                                   fcb
                                           8
                                                                                                    FE67 8D
                                                                                                              30
                                                                                                                   FE99
                                                                                                                                  bsr
                                                                                                                                          abc
```

77	FE69 19A8	84	1	ldy 4	4.x		121	CISE ISE	F #2		sts	2,x	
78	FE&C 18BF	CC16			escrr		122	C111 10E			sts	4,x	
79	FE7# 8E	FE#7	1		ststab	point to stack table	123	C114 7E	CD#3	theEnd	jæp	WARMS	
8.	FE73 18EE	84	1			reset stack pointer	124	0117 /6	CDBS	CHECHO	)=h	CUNHA	
81	FE76 86	<b>#</b> 2			02	. and the particular	125					1-11	
82	FE78 B7	FESS			ank	set to bank c	120				end	init	
83			* switch			SEC CO DEIIX E							
84	FE7B 7F	FFAD		7	atchd		Nar	ne ME	MEND.	CMD			
85	FE7E 7F	FFAF	_		latchf								
86	FE81 86	63			l'c		2	yntax	MEME	ND (a	ddr)	where	(addr) is a value
87	FE83 B7	CC4E			olus		fror	n 0 to	BFFF a	and is	opti	onal. I	n both cases the
88	1100 07	CUTE				and line if there	curi	ent va	lue of M	EME	NĎ i	s renor	ted
89	FE86 BD	CD42						0110 100	01 111	LIVIL	10 1	3 repor	icu.
					P /	Get address if there							
98	FE89 25	<b>Ø7</b> FE92			exit	no address							
91	FEBB 5D			stb									
92	FE8C 27	<b>64</b> FE92	b		exit		T .						
93	FEBE AF	6A	177		\$A,5	Where dummy was put	Lis	ting 2:					
94	FE9# 35	FF	p	uls c	c,a,b,dp,	x,y,u,pc pull and goto address							
95	FE92 BE	CD#3	exit l	dx #	**cd#3								
96	FE95 AF	6A	5	tx \$	A, 5	Also where dummy was put	9		nam MEM	END. CHD			
97	FE97 35	FF	p	uls c	cc,a,b,dp,	x,y,u,pc (jmp WARMS)	1			# Memory	end re	port and	set
98							2			,		,	
99							3		CC2B	HEMEND	equ	\$CC2B	FLEX memory end pointer
188	FE99 8E	FE#7	abc 1	dx 9	Iststab	Point to table	4		CD#3			\$CD#3	FLEX return address
161	FE9C B6	FE##	1	da b	bank	get old bank	5		CD24	PCRLF	egu	\$CD24	cr and 1f
162	FE9F 48		a	sla		mul x 2	6		CD42	GETHEX	equ	\$CD42	FLEX get hex number routine
193	FEA# 1#EF	86	5	its a	2,X	store stack pointer for this bank	7		CD45	OUTADR		\$CD45	output 2 hex numbers
184	FEA3 8E	FEØ1	1	dx #	lesctab	Point to ESC table	8						
165	FEA6 18BE		1	dy E	ESCREG	get return address	9	C100			orq	\$c100	
186	FEAA 18AF	86	5	ty a	1,X	save it for return to this bank	10	C100 BD	CD42			GETHEX	get number to set memend to
157	FEAD 39		r	ts			11	C1#3 25	ØB C110			report	no change
188							12	C105 5D			tstb		
189		<b>BBAE</b>	size e	qu #	-\$fe00	Show size of main program	13	C106 27	Ø8 C11Ø	1	oeq i	report	
119			* Overlay	user c	command ta	ble in FLEX	14	C108 8C	BFFF			#\$BFFF	Check for high bounds
111	CC12		0	rg U	ITABLE		15	C10B 22	Ø3 C11Ø		- 12 m	report	once no magnitude
112	CC12 FEBD		f	db t	able		16	CIØD BF	CC2B			MEHEND	set new memend
113	-						17					1.000,000,000	
114			* Initial	ize rou	itine (cal	led only once)	18	C110 8E	CC2B	report 1	dx i	MEMEND	
115	C166				c188			C113 BD	CD24			PCRLF	
116	C188 7F	FFAE	init c	lr 1	atche	set to bank a			CD45		,	DUTADR	
117	C183 86	61	1	da #	l'a				CD24	•		PCRLF	
118	C165 B7	CC4E	5		lus				CD#3			MARMS	
119	C1#8 8E	FE#7	_			init stack table	23			,	٠ ٢-		
120	CIOB IDEF		5		, x		24				end s	start	

#### Notes

The BANK program breaks some rules and does some things in a crude way. I will use the excuse that I wanted to keep it simple for the magazine's sake, and yours, in typing it in. The truth of the matter is that when the program started working, I stopped. The user command table in FLEX can only be extended once. It already has the 'P' command added to it. That is why I included the 'P' command in the table in this program.

The correct way would have been for the program to do this rather than the brute force method I used. If you run programs that add to the UCT, then you should run them after you run this program. Programs that add to the UCT are MCOMMAND, AUTOTASK and JCP, among others. I run the BANK command from the STARTUP file so this is never a problem. When you switch to a bank, the stack pointer

is saved and the environment is pushed on the stack. Then the stack pointer for the bank we are going to use is restored, and the environment is pulled from that stack.

If the stack for both banks is the same, then the environment will be corrupted. This may be a problem with some programs. The proper way would be to save the environment in some protected area of memory. There is enough room here to do that, I just didn't get to it.

The location \$FE00 contains the number of the bank we are in, either 0, 1 or 2. This can be tested from your program. It would be possible to switch banks by poking the appropriate locations in memory. If you do this, you should set \$FE00 to indicate what you did for other programs to use.

You should also consider what the escape return register and the stack pointer will hold. It might be wise to

use the locations in this program for that. The other use for the extra 64K, as a RAM disk may be ready by the time you read this. Contact DSL for information on that.

As a RAM disk, you could get 256 sectors of programs and data in very fast access. This is another use for the extra memory that is different than what I've done here — RGS update. The system I did this on is an older one, and the 128K upgrade is no problem. The newer CoCo 2 has some space problems, and the 128K board from RGS that I got was an early one and had some minor bugs. I have sent it back to them, so I haven't had a chance to get this program to work with it.

I don't see any problem, though. Just change the code that switches banks to the RGS board, and it should work. I will give you an update, probably next month, about this.

# OS-9 UTILITY

# Random Numbers For The OS-9 C Compiler

#### By Lew Middaugh

or want of something or the other, an empire was lost. But without a random number generator, I could not build a fantasy empire to conquer. So I wrote a random number generator.

I wrote an assembly language random number generator for the Color Computer OS-9 C Compiler. It is written to allow its addition to a user C library. This article presents this random number generator and an example of its use in a game program. Along the way I'll briefly describe what a C compiler is, and how you go about preparing an executable program with the C compiler.

#### How A C Compiler Works, The Background

A C compiler is nothing more than a program that translates a C language program into a 6809 assembly language program. How is the C Compiler used to prepare a C program? Figure 1 presents an overview of the steps in the process of generating an executable C program.

The first step in preparing a C pro-

(Lewis Middaugh, a systems engineer at GTE, likes computers and FRP games. He is working on a fantasy game and finding this a never-ending quest.)

gram is to enter a C program using an editor. Unlike CoCo BASIC where you can just type in your program, a text editor is required to input your C program for the C compiler. The editor that is provided in the OS-9 operating system package can be used to input a C program. After your C program has been entered, it is then saved as an ASCII text file on the disk.

Once your program is safely stored on the disk, the C compiler is loaded and executed. The C compiler performs the remaining two steps in creating an executable C program.

First, the C compiler reads your program from the disk. Each line of the C program is compiled (translated) into a series of assembly language instructions. These resulting assembly language instructions are stored on the disk during compilation. Example 1 is an annotated listing of how two lines of a C program would be translated into assembly language.

The OS-9 C Compiler performs this translation process from C language to assembly language in four phases: macro pre-processing, compiler pass 1, compiler pass 2, and assembly language code optimization.

Next the OS-9 C Compiler starts the assembler program. An assembler trans-

lates the assembly language program into machine language. The assembler is loaded and executed and reads the assembly language program from the disk. During assembly the resulting executable machine code is stored on the disk.

The OS-9 C Compiler performs this process from assembly language to machine code in two phases — assembly and linking. It is the linking process that examines the C program for references to the user and system C library functions. If a reference is found, that library function is linked or added into the machine code version of the C program.

It is not necessary to completely understand assembly language programming in order to program in the C language. The programming is done in C; assembling the output of the C compiler is just a step in the translation process. However, to be effective in programming in C, it helps to understand assembly language.

Finally the C language program, now in machine code, can be loaded and executed. This whole process generates fairly fast executing machine code, in the ballpark of 10 to 100 times faster than CoCo BASIC. This is fast, but assembly language programming is still a little faster.

In summary, there are three steps in generating an executable C program. The first step is to enter the C program using a text editor. The second step is to use the C compiler to translate the lines of C program into a series of assembly language instructions. And the last step is to assemble these assembly language instructions into the binary machine code that the CoCo understands. This binary machine code is the executable version of the C program that can be loaded and executed.

Yes, it is longer and more involved than typing in a BASIC program. But the results are sometimes well worth the effort.

#### What Is A Library File?

In order to perform certain functions, the C compiler references a collection of commonly used position independent subroutines. These subroutines are called library routines and are contained in a library file. Routines from this file are added to your program during the assembly process.

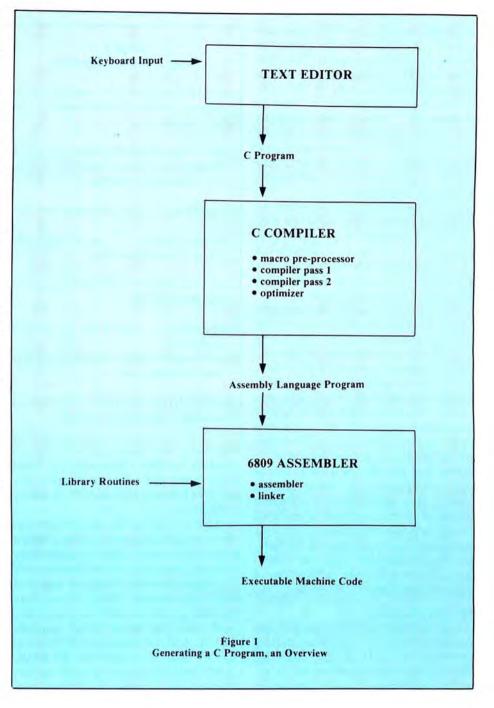
This library file contains the mathematical and logical functions needed to execute your program. These routines include addition, division, logical AND, arithmetic shift, and others. It also contains the keyboard, display, and disk I/O routines, character compare routines, and initialization and exit routines. Thus, these assembly language routines provide most of the common functions needed when executing a program. It is around these functions that the compiler builds your programs. Table 1 provides a partial listing of the library routines contained in the OS-9 C library.

If a function is needed that is not in the library, the programmer has at least three options. One way is to write a subroutine in C that performs this function in terms of the available functions. Another way is to simply do without. Or, the programmer could write a new library function. This last approach is how I chose to create a random number generator function.

#### The Random Number Library Routine

There were two things on my mind when I started. How does one generate a random number? And how does a C program call a machine language function? With a little research and the inspection of the assembly output of the C compiler, these questions were adequately answered.

From the research I found a method of generating random numbers that is



# Example 1 A Sample of the C Compiler Output (annotated)

\* \* printf("nPLAY AGAIN? (Y,N) n");

leax \_6,pcr pshs x lbsr printf

leas 2,s

stb 0,s

get the memory address of the print string save it on the system stack as required by printf() go print the string using the library function printf() adjust the system stack pointer to remove the string

address

\* \* again = inkey ();

lbsr inkey go get the next character from the keyboard using the

user library function inkey () store the new value of 'again'

273

simple and easy. In the TTL Cookbook by Don Lancaster, there is a section on pseudo-random sequencers. These are based on shift registers that provide a pseudo-random sequence of ones and zeros. It is pseudo-random in that a 31 bit sequence of ones and zeros repeats itself every two billion bits or so. By grouping these ones and zeros into groups of eight, a number between zero and 255 is generated that is sufficiently random for most game uses.

The second question was answered by examining the assembly language output of the C compiler. C programs pass arguments (variables) to a function on the system stack. The system stack is also used to hold return addresses for subroutine and interrupt calls.

If a value is returned by the function, it is placed in the 16-bit D register by the function and retrieved by the calling program after the function is finished.

These cryptic remarks will be best cleared up by looking at Listing 1. This contains the rnd() routine that generates a random number. It returns an integer value between zero and 255. It is a software implementation of a hardware pseudo-random sequence generator.

However, this routine is not as nice as CoCo's RND function in BASIC. Listing 2 is a routine called die(). It returns a number between one and a specified number, up to a maximum of 255. This is similar to the CoCo BASIC RND function as it is commonly used. The following paragraphs provide explanation of these two routines.

#### The rnd() Routine

Line 20 is the label for the random number routine. Its value is the starting address of the rnd() routine. The value of this label is assigned when the library routines are linked to your C program during the translation process to create a machine executable program.

The first thing that needs to be done is initialization. Line 21 causes register X to point to the seed that is used to generate the next random number. This is done using the indexed addressing mode. As register Y points to the beginning of the data area and the offset will be set during the translation process to the location of the seed in the data area, this allows this instruction to be position independent. Thus, the rnd() function can be relocated to a different address and still perform properly without reassembly.

In Line 22, register B is loaded with 8. Register B is used as a counter. When it reaches zero we will have a new 8-bit

# Table 1 Some C Library Routines

printf (format, varlist) — output variables as specified by the format to the text screen.

fileptr=fopen(filename,action) — open the specified file for a specified action, e.g., reading or writing.

fclose(fileptr) — close the specified file.

char=getc(fileptr) — get a character from the specified file,

putc(char,fileptr) — write a character to the specified file.

isalpha(char) — tests if the character is alphabetic.

char=toupper(char) — converts a character to uppercase.

strcmp(string1,string2) — checks if string1 is identical to string2.

random number. (Remember, it takes eight ones and zeros to express any number between zero and 255 in binary notation.)

As every call to this function causes the seed to change, every call will return a different number. Also note that every time the program is loaded into memory the same sequence of random numbers will be generated. Thus, this random number generator suffers a same drawback that the BASIC RND function suffers. And, likewise, some of the techniques used to randomize the BASIC RND function could be used to randomize the C random number generator.

Starting at the label on Line 23 through Line 30, the task is to set the carry flag based on the EXCLUSIVE-OR of bit 28 and bit 31 of the previously mentioned seed. (We are referring to the seed as if it was a big four-byte 32-bit register where bit 1 is the leftmost bit.) This is the heart of the random number generator.

Lines 31 through 34 rotate the bits of the seed to the right. This causes the contents of the carry flag to be placed into the leftmost bit of the seed as the new most significant bit.

By doing this eight times, as provided by Lines 35 and 36, the eight most significant bits of a new seed have been generated. These bits are returned as the new random number in register D. Line 37 sets register D for return by loading D with a preset zero and the most significant byte of the random number seed. Line 38 then returns control to the calling routine.

#### The die() Routine

The die() routine, shown in Listing 2, scales the result of the rnd() routine to the desired range. In this, it works the same way the CoCo BASIC RND function works. For example, in CoCo BASIC, RND(8) returns a random number between one and eight. For the C language program, die(8) would also return a random number between one and eight.

How is this done? Line 24 defines the starting location of this routine. Line 25 gets a random number into the lower half of register D. (The D register is the A and B registers referenced as one register.) Line 26 loads register A with the number of sides on the die from the system stack. This number was saved on the user stack by the calling routine. The random number and the number of sides on the die are multiplied in Line 27.

To complete the scaling of the number, we need to divide the result by one more than the maximum value of the random number. This number is 256, which is also conveniently the same thing as dividing the result by two, eight times. Or by simply using the highest byte of the multiplication result in register A and ignoring the lowest byte in register B, we have effectively divided by 256. This is done in Lines 28 and 29.

The number in register B ranges from zero to one less than the number of sides of the die. Line 30 corrects this by adding one to this number in register B. Now the die roll is in register D, where the C program expects to find it on return. Then in Line 31, with its work done, the die() function returns control to the C program.

#### Example C Program

Three-Roll is a dice game that uses the die() routine. See Listing 3. This game is fairly simple at first glance. It is you vs. the house, which is your CoCo. And it's a tough game, with the probability entirely in favor of the house.

You get to roll a die four times adding the rolls to form a total. The house is also rolling a die, forming the house total. After each roll, you may raise your bet, which is matched by the house. After the fourth roll, if your total is higher than the house, you win the game and the pot.

However, there is one little complication. If you get six or more ahead of the house after any roll, you lose the game (and the pot!).

One small detail includes the following. In order to play, you must ante up a small amount in order to play each game of *Three-Roll*.

#### Three-Roll

Like PASCAL, C is also a structured programming language. In this it lends itself easily to a modular approach of program design. Structure charts can be used to help document this modularity and the interrelationships between the modules. Figure 2 presents a structure chart for the *Three-Roll* program.

As you can see, the *Three-Roll* program is broken up into five modules. The die() function used by the module roll is not shown. This function is a library function. The library functions used by *Three-Roll* are not shown.

The main module oversees the entire series of *Three-Roll* games that the user wishes to play. It initializes the number of tokens the player has to bet and determines if the the player wishes to

play again. Also, if the player is low on tokens, the house (CoCo) is happy to extend credit!

The randomize module asks for an input from the keyboard. Using this input, this module calls the rnd() library function the specified number of times in order to randomize the sequence of die rolls. This is not necessarily the best technique to randomize the rnd() function, but it is usable.

The playgame module plays a single game of *Three-Roll*. It causes the new die totals to be rolled, gets the player's bets, and determines if the player (you) either won or lost. It then returns to the number of tokens the player now has to the main module.

The roll module rolls the die for the house and the player. It sums up the new totals and informs the player of the rolls and the new totals. When this is done, it returns to the playgame module with the new house and player totals.

The getbet module asks the player for his bet. If the bet is not valid, for example, if the bet is for more tokens than the player has, the player is told the number of tokens left and is asked again for a bet. After a valid bet has been entered, the module returns to playgame with the bet.

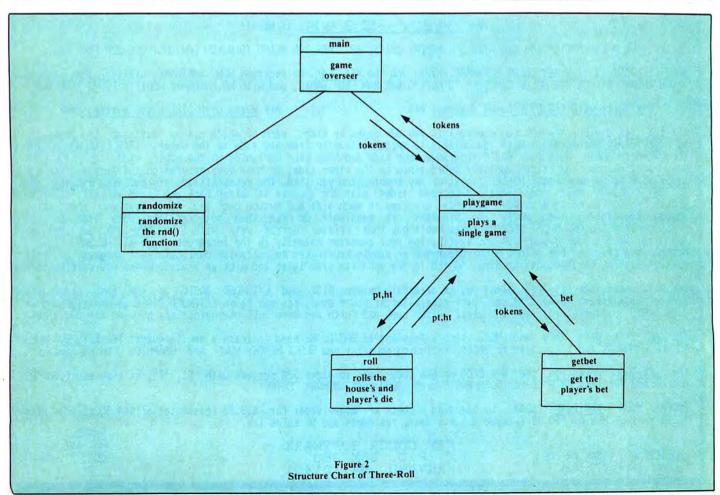
The program, Three-Roll, is shown in Listing 3. Using the module descriptions, most of the program lines can be followed. For further details on the C language, refer to one of the two C program language texts listed in the references.

#### A Loose End, The Inkey() Function

In the program listing of *Three-Roll* a function called inkey(), is used. This function is not a C function, but a library function that is included in my user library along with the die() and rnd() functions. It is not shown in the structure chart of Figure 2 as it is a library function. This function is shown in Listing 4.

Normally the C library function, getc(), or its derivative, getchar(), is used to get character input from the keyboard. This function is a line buffered read from the keyboard that returns a single character.

Thus, on the first call to getchar(), a line is read in from the keyboard. This line consists of all the characters that you typed in before pressing the ENTER key. The getchar() returns only the first character entered.



On the next call to getchar(), the second character that you entered is returned. This continues until all the characters you entered (including the ENTER key) have been returned. On the next call, another line is read in from the keyboard and the first character of the line is returned. And now the process continues as before.

What I wanted was an unbuffered, single-character read from the keyboard. In short, I wanted an INKEY\$ function somewhat like CoCo BASIC has. The inkey() function returns the character value of the next key pressed on the

keyboard.

What have we accomplished? We now have a random number generator for the OS-9 C Compiler; fantasy monsters beware! You have also read an introduction on how to use a C compiler and to the concept of a library function. (In many ways, these library functions are similar to BASIC's built-in functions.) As an example of the use of this random number generator, a dice game was presented. (A perfect pastime for fantasy Adventurers relaxing in the tavern.)

#### References

The following references were used in

understanding the C language and the application presented in this article.

Hancock, Les, The C Primer, (A Byte Book), McGraw-Hill Book Company, 1982. This book is intended for programmers who know nothing about the C language. This is not a complete description of the C language, but

"Like PASCAL, C is also a structured programming language. In this it lends itself easily to a modular approach of program design. Structure charts can be used to help document this modularity and the interrelationships between the modules."

provides the "stripped-to-essentials outline of C a beginner needs."

Kernighan, Brian W., and Ritchie, Dennis M., The C Programming Language, Prentice-Hall, Inc., 1978. The standard reference on the C programming language.

Lancaster, Don, TTL Cookbook, Howard W. Sams and Co., Inc., 1974, pages 277-281. This book describes the hardware pseudo-random sequencer on which the random number generator routine is based.

Leventhal, Lance A., 6809 Assembly Language Programming, Osborne/McGraw-Hill, Inc., 1981. One of the earliest reference books on 6809 assembly language programming. And still one of the best.

Ley, B. James, Computer Aided Analysis and Design for Electrical Engineers, Holt, Rinehart, and Winston, Inc., 1970. Chapter 10 on random number generators contains a discussion of random number generators and tests that can be used to verify that a random number generator is such. Using these tests, I satisfied myself that this random number generator was adequate for game use. Further testing would be required if it is to be used for any serious application.

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```
Listing 1:
99981 * rnd.a - random number generator Ver 1.8
98887 ±
         Copyright (c) 1984 by L.A.Middaugh
49943 *
          written to be included in a user library
           for RS/Microware's CoCo OS-9 C Compiler. Ver 01.00.00
99995 £
           Revised version of RND, 11-82 LAM
88886 ¥
           written for Duggar's Small C Compiler, Ver 1.0
99987 €
99098 * Purpose: rnd.c generates a random number between 0 and 255.
00009 * Call Sequence: rn = rnd()
#9010 * rn = value returned by rnd() function
88811 * Initial conditions: initial seed at label 'seed'
90012 * Registers affected: A,B,X
90013 * Results: value returned in register D.
99914 *
88815
99914
                              psect rnd a, 0, 0, 0, 0, 0
                               nam rnd_a
88817 8888
44418 4444
                               ttl rnd
88819
88828 8888
                     rnd:
88821 8888 38298888
                               leax seed, y point to seed
99922 9994 c698
                               ldb
                                              8 bits per random number
88823 8886
44474 4884 a484
                               lda 4.x
                                              exclusive or
                                              bit 28 with bit 31
88825 8888 46
                               rora
99926 9999 46
                               rora
88827 888a 46
                               rora
99928 999b a894
                               eora 4,x
                                              place result
99929 999d 46
                               rora
                                                in carry flag
88838 888e 46
                              rora
                                              rotate carry into bit 0
00031 000f 6601
                               ror
                               ror
                                                 as rotating entire
99932 9911 6692
                                    2.x
00033 0013 6603
                               ror 3.x
                                                  seed right
99934 9915 6694
                               rar
                                    4 , x
                                              do this
00035 0017 5a
                               decb
                                              eight times for new number
99934 9818 7APC
                               bne
                                    1000
                                              get new random number
00037 001a ec84
                               ldd
                                                  and return
88838 881c 39
                               rts
99939
90040 * set up a static variable for the seed
99841 9999
                               vsect
                                              zero for top half of D reg.
99942 9999 99
                      seed
                               fcb $8
                               fcc "RAND" the seed
00043 0001 52414e44
99944 9995
                               endsect
98945
99946 991d
                               endsect
Listing 2:
 99991 * die.a - die thrower Ver 1.0
 66662 ±
          Copyright (c) 1984 by L.A.Middaugh
           written to be included in a user library
 4 24888
           for RS/Microware's CoCo OS-9 C Compiler, Ver #1.00.00
 99994 ±
             Revised version of DIE, 11-82 LAM
 44445 £
             written for Duggar's Small C Compiler, Ver 1.8
 88886 ±
 99987 ¥
 #9988 * Purpose: die,a generates a random number between
 88889 * 1 and the number of sides on the die.
           The maximum number of sides is 255.
 44414 £
 88811 + Call sequence: rn = die(sides)
 ### rn = value of dice roll returned
          sides = number of sides on die
 46614 * Initial condition: second double-byte on system
 60015 * stack contains the number of sides on the die.
 #9916 * Registers affected: A,B,X
 86817 * Results: value returned in register D
 44418 #
 99919
                               psect die a, 8, 8, 8, 8, 8
 99829
                               nam die_a
 88821 8888
                               ttl die
 44422 4666
 88823
 44474 4848
                      die:
                                          get random number into register D
 99925 9999=17fffd
                               lbsr rnd
```

get # of sides into accumulator A

88826 8883 a663

lda

```
48427 4845 3d
                        au?
                                 now multiply them
00029 0006 1689
                        tfr
                                 get result divided by 256
99929 9998 4f
                       clra
99939 9999 50
                        incb
                                 set 1 as lowest number
99931 999a 39
                       rts
69832
99933 998b
                        endsect
99934
Listing 3:
 1 /#-----
 2
      THREE-ROLL, the dice game
 3
        Copyright (c) 1983 by L.A. Middaugh
 4
        Version 2.0, last revised 5 May 1983
 5
         revised for 09-9, 30 May 1984
 7 #include (stdio.h)
 8 #define INITIAL PURSE 100
 9 #define ANTE 1
10 #define OR !!
11 #define AND &&
13 int ht,pt;
                /* house total, player total */
14
15 main()
16
17
     int tokens; /* number of tokens player has
                                                   */
18
     char again; /* play again flag
                                                   #/
19
26
     randomize();
```

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```
21
    again = 'Y';
22
    tokens = INITIAL PURSE;
    printf("\nYOU START WITH %d TOKENS.\n", INITIAL PURSE);
23
24
    while ( again=='Y' AND tokens>0 )
25
26
      tokens = playqame(tokens);
27
      printf("\nYOU NOW HAVE %d TOKENS.\n",tokens);
28
      printf("\nPLAY AGAIN? (Y,N) \n");
29
      again = inkey();
      if ( again == 'y' ) again = 'Y';
38
31
      if { tokens<=1 AND again=='Y' }
32
33
        printf("\n\nYOU CREDIT HAS BEEN EXTENDED.\n\n");
34
        tokens = 50;
35
36
37
    printf("\nTHANKS FOR PLAYING!\n");
38
49 /*----
41
     Play a game routine, 4 or less die rolls
    42
43 playgame(tokens)
44 int tokens;
45
   {
46
    int pot.
              /* total number of tokens in pot */
             /* difference in totals
47
        diff.
                                            #/
48
               /* the player's bet
       bet.
                                            #/
```

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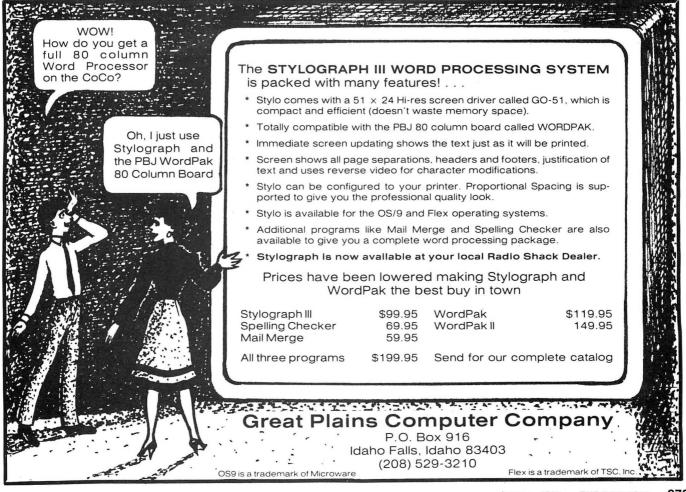
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```
49
         nroll; /* number of rolls this round
                                                  */
50
51
     printf("\nTHE ANTE IS %d. THANK YOU!\n", ANTE);
 52
     nroll=pot = 1;
53
     tokens = tokens - ANTE;
 54
     ht=pt=diff = 0;
55
     roll();
     while ( nroll(4 AND diff(6 )
57
58
       bet = getbet(tokens);
59
       pot = pot + bet + bet;
60
       tokens = tokens - bet;
       printf("THE CURRENT POT IS %d.\n".pot);
 61
62
       roll();
       proll++;
 63
       diff = pt - ht;
64
 65
     if ( pt>ht AND diff(6 )
66
67
48
       tokens = tokens + pot;
 69
        printf("\nYOUR TOTAL IS GREATER\n THAN THE HOUSE.");
76
       printf("\nYOU WIN !\n");
71
72
     else
73
74
       if ( diff>=6 )
75
         printf("\nYOUR TOTAL IS 6 OR MORE GREATER");
76
        else printf("\nYOUR TOTAL IS NOT GREATER");
77
       printf("\n THAN THE HOUSE.");
78
        printf("\nYOU LOSE...\n");
79
 85
     return(tokens);
81
 83 /*-----
       Get a valid bet from the player
 86 getbet (tokens)
 87 int tokens:
 88
    (
 89
     int bet;
                  /* the player's bet
                                                  */
 98
 91
     bet = -1;
 92
     while { bet ( 8 )
 93
 94
       printf("\nYOU HAVE %d TOKENS.\n",tokens);
 95
       printf("WHAT IS YOUR BET? (#-9) \n");
 96
       bet = inkey() - 48;
       printf("\n");
 97
 98
       if ( bet>9 OR bet(# )
 99
199
         printf(" THAT BET IS NOT PERMITTED.\n");
191
         bet = -1;
192
193
       if ( bet > tokens )
184
195
         printf(" BUT YOU ONLY HAVE %d TOKENS.\n",tokens);
196
         bet = -1;
```

```
187
         3
                                                                   ht = ht + hr; pt = pt + pr;
198
       }
                                                              135
                                                                   printf("HOUSE ROLLS A %d\n",hr);
189
     return(bet);
                                                              136
                                                                   printf("YOU ROLL A %d\n",pr);
119
                                                              137
                                                                   printf("\n HOUSE TOTAL IS NOW %d\n".ht);
111
                                                              138
                                                                   printf(" YOUR TOTAL IS NOW Zd\n".pt);
112 /*-
                                                              139
                                                                   return;
113
       Randomize the rnd() function.
                                                              140
                                                             141
115 randomize()
                                                             Listing 4:
116
117
     int count, /* Number of times to call rnd() */
                                                             . 25 69
118
         dummy; /* A place to dump rnd() result */
                                                             .es 71
119
                                                             .nf
120
     printf("\nHIT ANY KEY TO START.\n");
                                                             .br
121
     count = inkey();
                                                                 1 /*
                                                                        Unbuffered single character input
122
     while ( count-- > 0 ) dummy = rnd();
                                                                 2
                                                                        (see Kernighan & Ritchie, page 161)
123
     return;
                                                                      works much the same as CoCo BASIC INKEY$
124
                                                                       except it waits for next key pressed.
125
                                                                 5 #/
126 /#-----
                                                                 6 #include (stdio.h)
127
                                                                 7 #define CMASK Ø377 /* for making char's >Ø */
      Roll the dice and total results function
     128
129 roll()
                                                                 9 inkey()
130
                                                                16
131
     int hr,pr; /* house's roll, player's roll */
                                                                11
                                                                    char c;
132
                                                                    return( (read(0, %c, 1) > 0) ? c & CMASK : EOF );
                                                                12
133
     hr = die(6); pr = die(6);
```



# RANBOWIECH

# **RANDOM BASICS**

# Design And Development Of Application Software — Part V

By Paul Searby Rainbow Contributing Editor

his month's article is the last in the series on design and development of application software. There could be more, but I feel that I have accomplished my goal of describing and defining a method that will assist someone involved in developing a large application system. One of the main points I hope has come across is that organization of your thoughts is critical to the success of your project. Flowchart (outline) your system before thinking about the programming. Define your file layouts and report descriptions before you start the programming. As you go through these steps, you will think of items that should be considered and included before they become programming changes. Within these articles, Random BASIC was the language selected for the programming, but with many other high level languages now available for the CoCo, another language may be more suited to your particular application.

It is best to complete the design, set it down for a day or two, then come back to it and make the decisions as to language and the order in which the programs should be developed. We have talked about using "Top Down" methods in our development, including the programming phase. With the same qualification I gave to doing structured programming in BASIC, we will borrow from the Top Down programming philosophy, but not strictly adhere to it. This means that we will program some of the higher levels first, but when we get to a point that we can't continue writing code that can be tested, we will succumb to the lower levels and write the code required to keep progressing at the higher levels.

Did anyone guess what the scope of our Accounts Payable System really was? Since this is the last of the articles, I will give you my best estimate of the answer. At a minimum, it is nine programs, with an estimated total size of 75K to 90K worth of code. My estimate is based on having seven different completed application systems to compare. We could write one that takes less space or possibly one or two less programs, but our original charter included both user friendliness and maintainability. To keep those and our other given guidelines, the above estimate is probably, at best, conservative. Following is a breakdown on the nine proposed programs:

- APS100.BAS Master File Processing (Chart 2)
- 2) APS120.BAS Keyfile Generation / Reorganization
- 3) APS200.BAS Invoice File Processing (Chart 3)
- 4) APS400.BAS New Period Processing (Chart 4)
- 5) APS500.BAS Report Requests (Chart 5)
- 6) APS520.BAS Report Printing (Chart 5)
- 7) APS900.BAS Utility Processing and Master Menu (Chart 6)
- 8) SYS100.BAS Generalized Sort (Chart 5)

(Paul Searby has been involved with computers and data processing since 1969, working primarily on larger IBM systems until 1975 when he bought, built and programmed the first "personal computer" ever made — an Altair 8800, which came in kit form with 1 K of memory. In 1977 he left a position as project manager for a large corporation to devote his full efforts to his company, Computerware.)

# 9) SYS120.BAS — Generalized Merge (Chart 5)

Several of the programs have not been mentioned much because they are what I term "system programs." They are typically included in every system, and thus do not have to be written each time. In Accounts Payable, we will have a need for the generalized sort and merge programs. These utilities are used for sorting and merging extracted files for either report or keyfile generation purposes. They can be used in any application because the calling program tells them where to return control after they are finished. Another remaining program borders on being a general purpose utility: the Kevfile Generation and Reorganization program. The ability to generate and reorganize the Master's Keyfile is required in any system that uses Keyfile access. Thus if we

knew for sure that we were going to write additional applications using keyfiles, we might want to take the extra time to code *APS120.BAS* a little more general and place it in our library of SYSxxx programs.

The remaining six programs pretty much follow our flowchart. As to where to start, my choice would be parts of APS900. BAS (see examples), which has our top level Master Menu and many of the utilities required to get our system off the ground. Initially, I would only code the Master Menu, the System Control File creation and maintenance, the date routine and the Master, Invoice, Activity and Keyfile creation routines. The other features of APS900 can be added at a later date. After getting this working, we can now branch out into the other programs. Next would be Master File Processing, since all other files are dependent on the Master File.

Since access to the *Master* is via the *Keyfile*, we pretty much need to develop our *Master* and *Keyfile* logic together. This is where it gets nice to already have a *Keyfile Generation and Reorganization* utility. Assuming this is the first time, we will need to develop this logic as we work on the *Master* and *Keyfile* sections.

With a system that will end up being 75K to 90K in size, it is not easy to choose which examples of the coding should be included. I have chosen the "front end," being the Master Menu portion of the utility program and most of the file I/O logic of the Vendor File Maintenance Program. Also included is a generalized error routine that is appended to the end of each program. When you study these examples, please remember that they are only excerpts from programs, and as such have loose ends.

```
---> Master Menu Example <---
                                       Ø5ØØ PRINT TAB(8);" 3
                                                               New Perio
. sp2
                       A/P Master
                                       d Processing"
Ø1ØØ : APS9ØØ.BAS
                                                                Reserved"
                                       Ø52Ø PRINT TAB(8);" 4
 Menu and Utilites
                                                                Report Re
                                       Ø54Ø PRINT TAB(8);" 5
Ø12Ø : (C) 1984 Computerware - V
                                       quest Processing"
            Ø9/25/84
ersion 1.0
                                                                Reserved"
0140 :
                                       Ø56Ø PRINT TAB(8);" 6
                                       Ø58Ø PRINT TAB(8);"
                                                                Reserved"
Ø16Ø LINE= Ø : STRING=24 : DIGIT
                                       Ø6ØØ PRINT TAB(8);" B
                                                                Change th
S=Ø : RJUST=Ø
                                       e System Date"
Ø18Ø ON ERROR G. 9999
                                       Ø62Ø PRINT TAB(8);" 9
                                                                Utility P
Ø2ØØ LET Z$="APSSYS.DTA" : OPEN\
#19,2$
                                       rocessing" : P.
                                       Ø64Ø PRINT : P. TAB(9);
Ø22Ø READ \#19,PTR,CRT,DATE,DRV1
, DRV2, DRV3, XX, OPT1, OPT2, CNAME$
                                       0660 INPUT "Please make a select
Ø24Ø CLOSE \#19
                                       ion...", A : P.
                                       0680 IF A=0 C. "SYS000.BAS"
0240 :
                                       0700 IF A=1 C. "APS100.BAS"
Ø28Ø LET A$=STR$(DATE) : IF DATE
                                       0720 IF A=2 C. "APS200.BAS"
 < 750000 W$=" " : G.340
Ø3ØØ LET W$=MID$(A$,3,2)+"/"+MID
                                       0740 IF A=3 C. "APS400.BAS"
$(A$,5,2)+"/"+MID$(A$,1,2)
                                       0760 IF A=5 C. "APS500.BAS"
                                       Ø78Ø IF A=8 G.86Ø
Ø32Ø :
                                       Ø8ØØ IF A=9 G.116Ø
Ø34Ø HOME
                                       Ø82Ø GOTO 64Ø
0360 LET T0=24-LEN(CNAME$)/2 : P
                                       Ø83Ø :
. TAB (TØ) ; CNAME$
                                       Ø84Ø : Date Input Routine
Ø38Ø PRINT TAB(12); "Accounts Pay
                                       Ø85Ø :
able System" : P.
                                       0860 PRINT : INPUT"Enter Month (
Ø4ØØ PRINT TAB(12); "System Date
                                       1 - 12)", MTH
is: ";W$ : P.
                                       Ø88Ø IF MTH < 1 G.86Ø
Ø42Ø PRINT TAB(Ø5); "All Transact
                                       Ø9ØØ IF MTH > 12 G.86Ø
ions Entered will use this Date"
                                       0920 INPUT "Enter Day (1 - 31)",
 : P.
Ø44Ø PRINT TAB(8);" Ø
                        Return to
                                       DAY-
                                       Ø94Ø IF DAY < 1 G.92Ø
 the System Menu" : P.
                                       0960 IF DAY > 31 G.920
Ø46Ø PRINT TAB(8);"
                        Vendor Ma
                                       0980 INPUT "Enter Year (19xx)", Y
ster Processing"
                                       R
Ø48Ø PRINT TAB(8);" 2
                        Receive /
                                        1000 IF YR < 78 G.980
 Pay Invoices"
```

```
1020 IF YR > 99 G.980
                                       TINV, SPARE, BEGBAL, CURIN, CURPD, YT
1040 LET DATE=YR*10000+MTH*100+D
                                       DPD :
                                       1460 : LSTDT, NAME$, TITL$, ADDR$, C
AY
                                       TST$, PHAC, PHNUM, TERMS
1060 :
1080 LET Z$ = "APSSYS.DTA" : OPE
                                       1480 LET NAMSV$ = NAME$ : RET.
N\#19, Z$
                                       :: Save Vendor Name (KEY)
1100 PUT \#19, PTR, CRT, DATE, DRV1,
                                       1500 :
DRV2, DRV3, XX, OPT1, OPT2, CNAME$
                                       1520 : Vendor Master Output Rout
1120 CLOSE \#19 : G.300
1140 :
                                       1540 : Find space for Master add
1160 : System Utilites Start her
                                        in Keyfile
e . . . . .
                                       1560 : (VSTRT initially = start
                                       of the Keyfile)
1180 :
. PG
                                       1580 : (Deleted Master entries h
. sp
                                       ave their pointer negated)
                                       1600 :
                                       1620 IF MODESW <> 1 G.1900
---> Vendor File Maintenance Rou
tines <---
                                       164Ø RECNO \#13 = VSTRT
.sp2
                                       166Ø IF RECNO\#13 >= RSIZE\#13 G
1000 : The following are routines
                                       . 2040
 out of the Vendor File Maint.
                                       168Ø IF RECNO\#13 >= RNEXT\#13 R
1020 : Program. They include th
                                       ECNO\#10 = RNEXT\#10 : G.1780
e Master File Read and Write.
                                       1700 GET \#13, TEST : IF TEST >=
1040 : along with all the Keyfil
                                       Ø VSTRT = VSTRT+1 : G.164Ø
e Search routines. Also include
                                       1720 : Found a spot (TEST was ne
d
                                       gative)
1060 : are the Keyfile Extract f
                                       1740 LET LOC = ABS(TEST) : RECNO
or a new Keyfile and the Error
                                       1760 PUT \#13, TEST : VSTRT = VST
1080 : routine that is common to
 each program in the System.
                                       RT+1
1100 :
                                       178Ø LET LOC = RECNO \#1Ø
1120 : As an example, to get a V
                                       1800 RECNO \#13 = RNEXT \#13
endor via the ISAM Binary Search
                                       1820 PUT \#13, LOC, NAME$ : LIDX =
                                       LOC
1140 :
                                       1840 :
1160 INPUT "Please enter the des
                                       1860 : Write out Vendor Master
ired Vendor Name", TARG$
                                       1880 :
1180 LET LT = LEN(TARG$) : GOS.2
                                       1900 PUT \#10, VIDX, VNUM, STINV.LS
260 : IF HIT <> Ø G.1260
                                      TINV, SPARE, BEGBAL, CURIN, CURPD, YT
1200 PRINT : INPUT "Do you want
                                      DPD :
to try again (Y/N)", ANS$ :P.
                                      1920 : LSTDT, NAME$, TITL$, ADDR$, C
1220 IF ANS$ = "Y" G.1160 :ELSE
                                      TST$, PHAC, PHNUM, TERMS
exit to Menu
                                      1940 :
1240 :
                                      1960 IF MODESW <> 2 RET. :: 2 =
1260 RECNO\#10 = KLOC : GOS.1440
                                      change (was Key chgd?)
                                      1980 IF NAME$ = NAMSV$ RET.
:: You now have Master!
1280 :
                                      2000 PUT \#13,0 : CURPOS = RECNO
1300 : The Vendor Master output
                                      \frak{13}: RECNO\#13 = RNEXT\#13
(write) routine can handle both
                                      2020 PUT \#13,KLOC,NAME$ : RECNO
1320 : Adds and Changes. For an
                                      \#13 = CURPOS : RET.
Add, MODESW = 1 - for a Change,
                                      2040 :
                                      2040 HOME : P. "KEYFILE FULL - yo
1340 : MODESW = 2.
                   MODESW is ac
tually the selection option from
                                      u MUST reorganize the Keyfile be
1360 : the Vendor File Maintenan
                                      fore"
                                      2080 PRINT "you can continue usi
ce Menu, serving dual purposes.
1380 :
                                      ng the Accounts Payable System..
1400 : Read Master
                                      2100 : [ here would be a GOTO to
1420 :
                                       the Vendor Maintenance Menu ]
1440 GET \#10, VIDX, VNUM, STINV, LS
```

. PG .SP2 2120 : 2140 : Binary Search Routine 2160 : 2180 : Entry Variables are TARG\$ and LT ( = LEN of TARG\$) 2200 : OVFL = Start of Overflow Area (in 1st Vendor Record) 2220 : Output is KLOC (Record \# of Master) and HIT  $(\emptyset = no)$ 2240 : 2260 LET HIT = Ø : FIRST = 6 : L  $AST = OVFL-1 : OVFLG = \emptyset$ 228Ø LET MID = INT((FIRST+LAST) 2) 2300 RECNO \#13 = MID 232Ø GOSUB 324Ø 234Ø IF TARG\$ = KEY\$ G.2420 2360 IF TARG\$ > KEY\$ IF MID < LA G. 228Ø ST THEN FIRST = MID+1 : 238Ø IF TARG\$ < KEY\$ IF MID > FI RST THEN LAST = MID-1 : G.2280 2400 GOTO 2860 2420 LET CURPOS = RECNO \#13 : I F CURPOS = FIRST G.2520 2440 RECNO \#13 = CURPOS-1 246Ø GOSUB 324Ø

248Ø IF TARG\$ = KEY\$ G.242Ø 2500 RECNO \#13 = CURPOS : GOS.3 240 2520 IF KLOC <= 0 GOS.3200 : G.2 520 2540 IF TARG\$ = KEY\$ G.2620 : EL SE G. 2860 2560 : 2580 : Got a Hit - Exit 2600 : 2620 LET HIT = 1 : RET. 2640 : 2660 : Re-entry to look for more with same Key 268Ø : 2700 IF OVFLG > 0 G.2900 272Ø GOSUB 32ØØ 2740 IF TARG\$ <> KEY\$ G.2860 2760 IF LEN(VENKEY\$) < 2 GOS.320 Ø : ELSE G.262Ø 278Ø GOTO 274Ø 2800 : 2820 : Sequential Search thru ov erflow Area 2840 : 2860 IF OVFL >= RNEXT \#13 G.304 2880 RECNO \#13 = OVFL-1 : OVFLG



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= 1
2900 GOSUB 3200
2920 IF KLOC <= 0 G.3020
2940 IF TARG\$ <> KEY\$ G.3020
2960 IF LEN(VENKEY\$) < 2 GOS.320
Ø : ELSE G.262Ø
298Ø GOTO 294Ø
3000:
3020 IF RECNO \#13 < RNEXT \#13-
1 G. 2900
3040 IF HIT > 0 G.3080
3060 PRINT : P.TARG\$; " was not f
ound" : G.3100
3080 PRINT : P. "That's all I hav
e!!" : P.
3100 INPUT "Press RETURN to cont
inue", A
312Ø LET HIT = Ø : RET.
3140:
3160 : Read a Record from the Ke
y file
3180 :
3200 IF RECNO\#13 >= RNEXT\#13-1
KEY\$ = "" : RET.
3220 RECNO \#13 = RECNO \#13+1
324Ø GET \#13, KLOC, VENKEY\$
3260 LET KEY\$ = LEFT\$(VENKEY\$,LT
)

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328Ø RETURN . PG .SP2 3300 : 3320 : Keyfile Extract for New K ev Generation 3340 : 3360 LET Z\$ = "SYSWKS.UKY" : OPE N\#1.Z\$ : SCRATCH\#1 338Ø RECNO \#1Ø = 1 3400 RECNO \#10 = RECNO\#10 + 1 3420 IF RECNO\#10 >= RNEXT\#10 G 344Ø IF RECNO\#1Ø = RSIZE\#1Ø G. 3560 3460 GOSUB 1440 :: Read Master F ile 348Ø LET ZLOC = RECNO\#1Ø 3500 IF LIDX = 0 THEN ZLOC = -ZL OC : : SHOW AS EMPTY 3520 WRITE \#1, ZLOC, NAME\$ 3540 GOTO 3400 3560 CLOSE \#10,\#1 3580 LET Z\$ = "SYSWKS.CTL" : OPE N\#1, Z\$ : SCRATCH\#1 3600 WRITE \#1, "APS120.BAS".1.0. Ø, Ø : CLOSE\#1 3620 CHAIN "SYS100.BAS" 3640 : 3660 : Generalized Error Routine 3680 : 3700 IF ERCODE <> 33 G.3740 3720 PRINT "File / Program "; Z\$; " was NOT found !!" 3740 LIST \#PTR, 100-140 : P.\#PT 3760 PRINT \#PTR, "An unrecoverab le ERROR has been detected." 3780 PRINT \#PTR, "Please save th e following information: ": P. \#PTR 3800 PRINT \#PTR, "The ERROR code was : ": ERCODE 3820 PRINT \#PTR, "The Line Numbe r was "; ERLINE : P.\#PTR 3840 IF ERCODE = 33 G.3880

3860 IF ERCODE > 60 G.3880 : ELS E P.\#PTR,CHR\$(12) : P.CHR\$(7) :

388Ø PRINT \#PTR, "The error rela tes to disk data file operation.

3900 PRINT \#PTR, "You may be abl e to solve the problem with one

3920 PRINT \#PTR, "System Utiliti

es - going to Utility Processing

3940 CHAIN "APS900.BAS"

of the"

After we have a functioning Master and Keyfile, we can progress to the coding of receiving or paying invoices (Invoice File Processing). This is where a lot of our common routines come into use. We will need to develop the *Invoice* File linkage to the Vendor Master, but will be able to reuse the ISAM Keyfile lookup for the Master File that was developed in APS100.BAS. Again, I would concentrate initially on just getting the system capable of reading and writing invoice records, leaving check writers and other frills to another time. This program also needs the capability of writing out activity records. This code should be done as you are doing the adjustment and payment portions.

To really be able to check the integrity of the Accounts Payable System, we need "eyes" or reports. Thus, the next programs to tackle should be the report extract and a crude version of the report printing. Initially, these can be used to insure that the Master, Invoice and Activity files are getting updated properly. When I say a crude version, I mean that we are trying to implement the reports as designed, but aren't too concerned about tab settings, etc. At this point we primarily want to see the data,

and can make it look prettier once we're convinced that all our update logic is working correctly. Lastly, New Period *Processing* can be coded, allowing us to reset the system and again recheck our

"It is best to complete the design, set it down for a day or two, then come back to it and make the decisions as to language and the order in which the programs should be developed."

Once we have the BASIC system operational, we can then go back and complete the remaining functions. Possibly by this time, either we have seen a need for some changes, or have shown the system to a potential customer and they have asked for some changes. If we get to this step before the complete system

is programmed, the odds are that less code will have to be changed than if we wait until we are through. An item that is required, but has not been mentioned to date, is a manual. When is the best time to write the manual? Ideally, it should have been written before we started and used as a guideline while programming. In practice, it typically is written after the system is completed. A good compromise, and one that has some benefits, is to develop it while the programming is taking place. If possible, have someone else do the manual. I say this because first, programmers don't generally write good manuals (and they usually hate doing it), and secondly, if someone else is trying to explain the system, they will spot oversights that the programmer may miss. This may not be a program error as such, but more likely a clearer way to present the information.

I am looking for suggestions for subject matter to cover in future articles. The topics should be somewhat general in nature, leaving the specifics, on OS-9 as an example, to those who have columns on those subjects. If you have a suggestion, please send it to me care of Computerware, Box 668, Encinitas, CA 92024.



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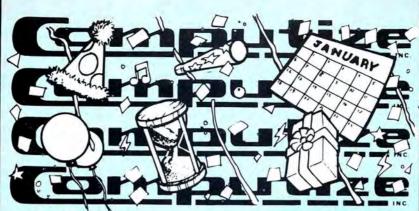












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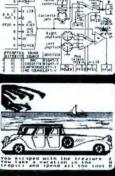
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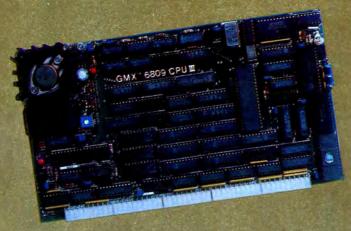
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